TANDBERG
Television

ST.TM.E10076.3
Issue 3
ENGLISH (UK)

INSTRUCTION MANUAL

E5714/E5740-xxx DSNG, E5715/E5750
DENG Voyager Encoder

Build Version 2.1.0 to 3.1.0 (and later)

M2/VOY/E5714, M2/VOY/E5740-xxx,
M2/VOY/E5715, M2/VOY/E5750
and Options





evolution5000

ENGLISH (UK)

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Issue 3 first published in 2002 by:
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HAMPSHIRE,
SO30 4DA

Registered Company Number 03695535

List of Contents

About this Manual

This manual provides instructions and information for the installation, operation of the Encoder.

This manual should be kept in a safe place for reference for the life of the equipment. It is not intended that this manual will be amended by the issue of individual pages. Any revision will be by a complete reissue. Further copies of this manual can be ordered from the address shown on *page viii*. If passing the equipment to a third party, also pass the relevant documentation.

Issues of this manual are listed below:

Issue	Date	Build Version	Comments
1	Dec 2000	2.1.0 – 2.2.0	E5714/E5740 initial release.
2	Sept 2002	2.1.0 – 3.0.0	Update for 3.0.0.
2	Dec 2002	2.1.0 – 3.1.0	Update for 3.1.0. New option modules added.

> NOTE...
> The Build Version in the table refers to an overall number which encompasses all the various software/firmware versions of video, audio, etc in the Encoder.

The following manuals are also associated with this equipment:

- ST.TS.SNMP.E10074: Simple Network Management Protocol
- ST.TS.E10074 Remote Control Protocol
- ST.AN.1094: Video Noise Reduction and Compression
- ST.AN.1110: Near Loss-less MPEG Concatenation Without Helper Signals
- ST.AN.BW.E10074: Variable Bandwidth Feature of E57xx Encoders

Nomenclature

The terms RS-232 and RS-422 have been superseded by EIA-232 and EIA-422. However, because the original names are inscribed on the Encoder the original terms are used in the text of this manual.

Acknowledgements

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All warnings on the product and in the operating instructions should be adhered to. The manufacturer can not be held responsible for injuries or damage where warnings and cautions have been ignored or taken lightly.

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All the safety and operating instructions should be read before this product is operated.

Follow Instructions

All operating and use instructions should be followed.

Retain Instructions

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WARNINGS GIVE INFORMATION WHICH, IF STRICTLY OBSERVED, WILL PREVENT PERSONAL INJURY OR DEATH, OR DAMAGE TO PERSONAL PROPERTY OR THE ENVIRONMENT. THEY ARE BOXED AND SHADED FOR EMPHASIS, AS IN THIS EXAMPLE, AND ARE PLACED IMMEDIATELY PRECEDING THE POINT AT WHICH THE READER REQUIRES THEM.

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Cautions give information which, if strictly followed, will prevent damage to equipment or other goods. They are boxed for emphasis, as in this example, and are placed immediately preceding the point at which the reader requires them.

NOTES...

Notes provide supplementary information. They are highlighted for emphasis, as in this example, and are placed immediately after the relevant text.

EMC Compliance

This equipment is certified to the EMC requirements detailed in *Annex B, Technical Specification*. To maintain this certification, only use the leads supplied or if in doubt contact Customer Services.

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Internet Address:	http://www.tandbergtv.com

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Where to Find Us

For further information on TANDBERG Television's training programme please contact us:

International Telephone:	+44 23 8048 4229
International Facsimile	+44 23 8048 4467
E-mail Address:	training@tandbergtv.com
Internet Address	http://www.tandbergtv.com

Customer Services and Technical Training Postal Address

Tandberg Television
Unit 2
Strategic Park
Comines Way
Hedge End
Southampton
Hampshire
SO30 4DA
United Kingdom

Return of Equipment

If you need to return equipment for repair, please contact the Customer Services Helpdesk on +44 (0) 23 8048 4455. A Returns Authorisation Number (RAN) will be issued and full details of the unit will be logged. Please ensure the RAN number is clearly marked on the packaging of the unit. The unit should then be sent to the following address:

Tandberg Television – Customer Services
Unit 1
Strategic Park
Comines Way
Hedge End
Southampton
Hampshire
SO30 4DA
United Kingdom

Technical Publications

If you need to contact TANDBERG Television Technical Publications regarding this publication, e-mail: techpubs@tandbergtv.com.

Chapter 1

Introduction to the Basic Encoder

Contents

List of Figures

List of Tables

1.1 Scope of this Manual

1.1.1 Who Should Use This Manual

This manual is written for operators/users of the 1U and 2U Voyager Encoders to assist in the installation, operation and day-to-day care. These Encoders are referred to throughout this manual as 'Encoder(s)' unless there is a specific difference, where they will be referred to by the model number.

WARNING...

DO NOT REMOVE THE COVERS OF THIS EQUIPMENT. HAZARDOUS VOLTAGES ARE PRESENT WITHIN THIS EQUIPMENT AND MAY BE EXPOSED IF THE COVERS ARE REMOVED. ONLY TANDBERG TELEVISION TRAINED AND APPROVED SERVICE ENGINEERS ARE PERMITTED TO SERVICE THIS EQUIPMENT.

CAUTION...

Unauthorised maintenance or the use of non-approved replacements may affect the equipment specification and invalidate any warranties.

This manual does not include any maintenance information or procedures which would require the removal of covers.

1.1.2 Build Version

This manual has been written to cover the functionality in *Table 1.1*.

Table 1.1: Build Version

	E5714, E5740, E5715, E5750
Build Version	2.1.0 – 3.1.0 and later

The Build version indicates the status of the Encoder and refers to an overall number which encompasses all the various software/firmware versions of video, audio, etc. in the basic Encoder.

The current Build version can be found in the `Build` Menu (see *Chapter 4, Operating the Equipment Locally, Figure 4.9*). This number should be quoted in all correspondence with TANDBERG Television.

This manual continues to be relevant to subsequent Build versions where the functionality of the equipment has not changed. When a new issue of the Build version changes the functionality, a new issue of this manual is provided.

1.1.3 What Equipment is Covered by This Manual

Equipment Models

Each model of Encoder comprises an enclosure with a Base Board and Modulator fitted as standard. The E5714 and E5740 are fitted with a Satellite Modulator; the E5715 and E5750 are fitted with an OFDM Modulator.

There are vacant slots for option modules; one in the E5714 and E5715; three in the E5760; four in the E5740; five in the E5750. These slots can be occupied by any combinations of modules shown in *Chapter 3, Options and Upgrades*.



Figure 1.1: 1U Encoder Front View



Figure 1.2: 2U Encoder Front View

No options need be fitted but any slot not occupied by an option module must have a blank module or blanking plate fitted (see *Chapter 3, Options and Upgrades*).

The marketing codes, part numbers and model numbers of the basic units are shown in *Table 1.2*, those of the option modules in *Chapter 3, Options and Upgrades.*

Table 1.2: Equipment Model Descriptions

Model Number	Part Number	Marketing Code	Description
E5714 Encoder	E10110	M2/VOY/E5714	1U MPEG-2 DSNG Encoder with QPSK modulator. Has 4:2:0/4:2:2[1] video encoding mode and fully exhaustive motion estimation.
E5715 Encoder	E10111	M2/VOY/E5715	1U MPEG-2 DENG Encoder with OFDM modulator. Has 4:2:0/4:2:2[1] video encoding mode and fully exhaustive motion estimation.
E5740 Encoder	E10076	M2/VOY/E5740	2U MPEG-2 DSNG Encoder with IF output satellite modulator. Has 4:2:0/4:2:2[1] video encoding mode and fully exhaustive motion estimation.
E5740 Encoder	E10122	M2/VOY/E5740-IF/12-36V	12 to 36 V dc powered 2U MPEG-2 DSNG Encoder with IF output satellite modulator. Has 4:2:0/4:2:2[1] video encoding mode and fully exhaustive motion estimation.
E5740 Encoder	E10130	M2/VOY/E5740-LBAND	2U MPEG-2 DSNG Encoder with L-band output satellite modulator. Has 4:2:0/4:2:2[1] video encoding mode and fully exhaustive motion estimation.
E5740 Encoder	E10131	M2/VOY/E5740-LBAND/12-36V	12 to 36 V dc powered 2U MPEG-2 DSNG Encoder with L-band output satellite modulator. Has 4:2:0/4:2:2[1] video encoding mode and fully exhaustive motion estimation.
E5750 Encoder	E10078	M2/VOY/E5750	2U MPEG-2 DENG Encoder with OFDM modulator. Has 4:2:0/4:2:2[1] video encoding mode and fully exhaustive motion estimation.

[1] 4:2:2 is only available when software option M2/ESO2/422 is purchased.

Information Label

There are two information labels which identify the configuration of the unit. *Figure 1.3* and *Figure 1.4* are typical examples.

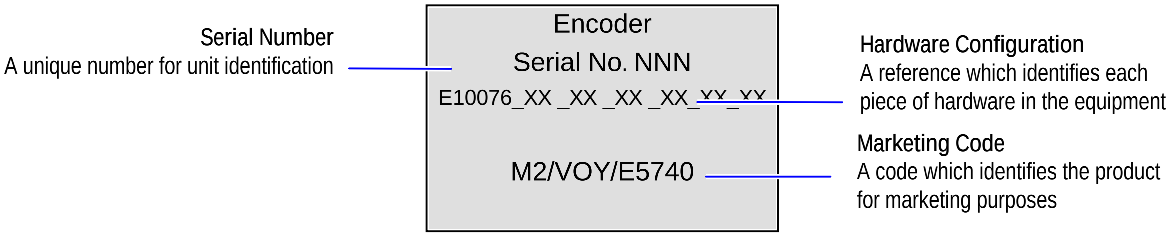


Figure 1.3: Information Label 1

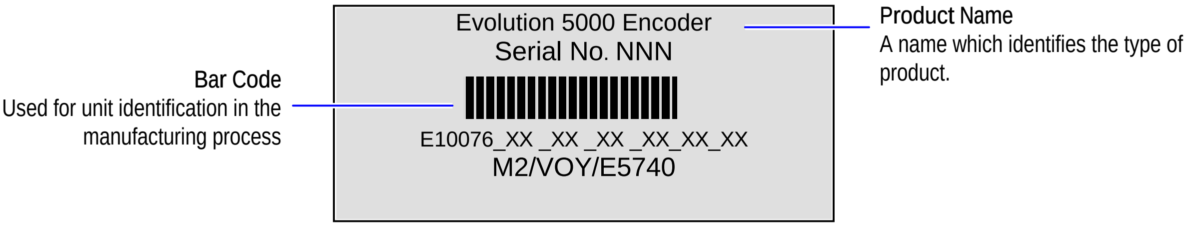


Figure 1.4: Information Label 2

Hardware Configuration

Each piece of hardware has a specific reference number. These are linked to give a hardware configuration number (see *Figure 1.3*) for the whole unit. The first part of the number refers to the enclosure and any modules forming part of the basic unit, and each subsequent part of the number refers to an option module. Refer to *Chapter 3, Options and Upgrades* for the possible positions of each option module.

Build Revision

The build revision refers to the physical status of the enclosure and any option modules at the time the equipment was shipped from the factory. It is NOT the same as the Build version, which relates to software and firmware.

1.2 Role of the Encoder in a System

1.2.1 Typical System

The Encoder is a transportable digital exciter designed specifically for mobile contribution applications. It is compact and lightweight, fully MPEG-2 and DVB or ATSC compliant and has high performance for the transmission of studio-quality video material. The equipment is designed to be suitable for both flyaway use (within an appropriate flight case) and truck installation.

The E5714 and E5740 contain the same high performance encoder. The E5714 is a 1U chassis housing the encoder and a QPSK satellite modulator. The E5740 is a 2U chassis housing the encoder, and a satellite modulator capable of QPSK, 8PSK[2] and 16QAM[3] modulation.

The Encoder has one card, containing a single video encoder, two stereo audio encoders (dual standard MPEG-1 (layer 2)/Dolby Digital (AC-3)[4]), composite video decoder, CA[5], data input and general purpose VBI extraction and encoding circuitry. It also contains either a satellite modulator or an OFDM modulator.

High quality 4:2:0 or 4:2:2[6] video encoding is ensured by the inclusion of digital noise reduction techniques[7] and many other proprietary algorithms as well as standard MPEG compression techniques. Fully Exhaustive motion estimation is also used.

Video can be input to the unit in serial digital component (SDI) format or composite analogue (PAL/NTSC). There is also a logo overlay facility allowing broadcasters to trademark material.

The audio functionality supports multiple sampling frequencies, bit-rates and coding modes. Audio can be input in balanced analogue, digital AES/EBU input as a discrete channel or embedded on serial digital video. Various coding standards are supported, including Linear PCM. Additional audio channels can be accommodated by purchasing the option module M2/EOM2/AUDLIN.

Unit functionality can be further extended with option modules (see *Chapter 3, Options and Upgrades*).

1.2.2 DSNG Systems

Overview

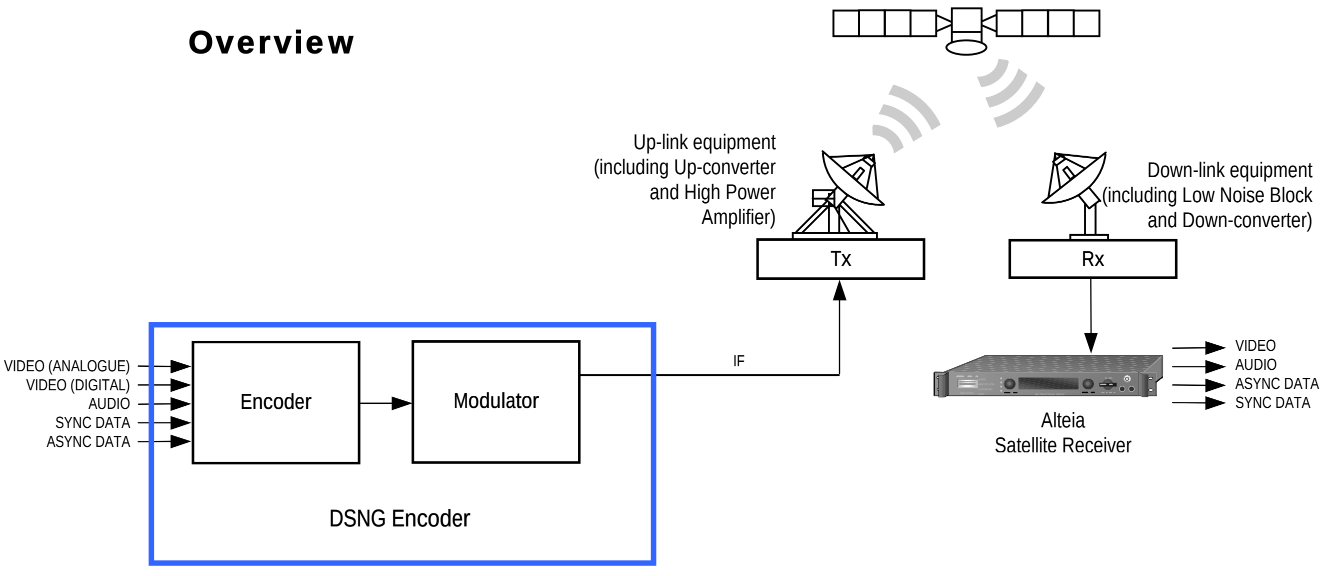


Figure 1.5: Typical DSNG Encoder Configuration

[2] 8PSK is only available when software option M2/ESO2/SM38PSK is purchased.
[3] 16QAM is only available when software option M2/ESO2/SM316QAM is purchased.
[4] Dolby Digital (AC-3) is only available when software option M2/ESO2/AC3 is purchased.
[5] CA relates to RAS and BISS. RAS and BISS are only available when software options M2/ESO2/RAS and M2/EDCOM2/BISS are purchased. A E57xx Encoder may be fitted with both RAS and BISS options but only one scrambling format can be used at any one time. BISS is available from Build version 2.1.0 but BISS- is not supported before Build version 2.2.0.
[6] 4:2:2 is only available when software option M2/ESO2/422 is purchased.
[7] Noise reduction is only available when software option M2/ESO2/NR is purchased.

E5714

The satellite modulator within the E5714 supports QPSK modulation in accordance with EN 300 421 (DVB-S). It provides a main and monitoring IF Output. The IF frequency can be tuned between 50 MHz and 90 MHz.

E5740/E5760

The satellite modulator fitted within the E5740 is capable of QPSK modulation in accordance with EN 300 421 (DVB-S), and is also capable of 8PSK and 16QAM modulation in accordance with EN 301 210 (DVB-DSNG). It is available in two variants. One provides an IF output tuneable in the range 50 MHz to 180 MHz. The other provides an L-band output tuneable in the range 950 MHz to 1750 MHz.

1.2.3 DENG Systems

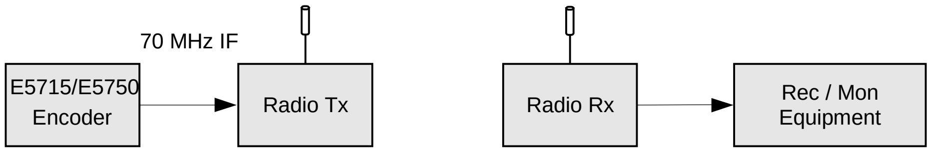


Figure 1.6: Typical DENG System Configuration

The OFDM modulator fitted in the E5715 and E5750 takes the Encoder's output transport stream, and uses Coded Orthogonal Frequency Division Multiplexing (COFDM) to spread the data over 1705 carriers (2k mode) or 6817 carriers (8k mode). This means that relatively low data rates can be used on each carrier frequency, and any multipath effects (ghosting) which occur affects only a small amount of data.

The carriers are closely spaced so that their sidebands overlap, but due to the orthogonal relationship between carrier frequencies they do not interfere with each other. This makes the system spectrally efficient.

Noise, multipath effects, co-channel interference and other impairments can cause some bits to be received in error. Therefore, Forward Error Correction (FEC) consisting of Reed-Solomon (RS) coding followed by convolution coding is used to add extra bits to the transmitted signal. This allows a large number of errors at the receive end to be corrected by convolutional (Viterbi) decoding followed by RS decoding.

Five convolutional rates are available: ½, $^2/_3$, ¾, $^5/_6$ and $^7/_8$. These provide different compromises between bit-rate and ruggedness.

The modulation scheme used on each carrier can either be QPSK, 16QAM, or 64QAM. These also provide different compromises between bit-rate and ruggedness, QPSK being the most rugged.

Four guard intervals are available $^1/_{32}$, $^1/_{16}$, $^1/_8$, and ¼. These are used to reduce the effects of intersymbol interference at the receive end caused by multipath propagation.

The output of the modulator is 70 MHz IF for connection to a suitable radio transmitter.

1.3 Summary of Features

1.3.1 Video Encoding

MPEG-2 Encoding

The Encoder processes a broadcast-standard video signal into a compressed encoded bit-stream in accordance with:

- The MPEG-2 Main profile @ Main level (MP@ML) specification (ISO/IEC 13818)
- The MPEG-2 4:2:2[8] profile @ Main Level (422P@ML) specification (ISO/IEC 13818)

Video Encoding Modes

Either the 4:2:0 or 4:2:2[8] video encoding modes can be selected. The coding mode selected affects the compression techniques, encoder delay and rate control.

Video Inputs

The standard video inputs are:

- **SDI** - Serial Digital Interface - ITU-R BT.656-4, part 3 (D1 serial format) – SMPTE 259 (component only)
- **Composite Analogue** (PAL/NTSC)

Video Input Types

The video input types which are supported are:

- 625-line composite PAL-B, -D, -G, -H or -I (ITU-R BT. 624-4)
- 525-line composite NTSC-M (with and without pedestal) or PAL-M (ITU-R BT. 624-4)
- Serial digital (ITU-R BT.656-4, part 3) input (D1 serial format) and (ANSI/SMPTE 259M) (component only)
- Internal test pattern function

Serial Digital Video Input Error Detection and Handling (EDH)

The serial digital video input supports error detection and handling (EDH)[9] as defined by the specification SMPTE RP 165-1994, 'Error Detection Checkwords and Status Flags for Use in Bit Serial Digital Interfaces for Television'.

Video Encoding Functions

The standard video encoding functions include:

- Support for all MP@ML and 422P@ML[8] standard coding modes
- Selectable bit-rate operation, <1.5 Mbit/s - 50 Mbit/s (see *Table 1.3*)[10]
- Support for the standard set of video picture resolutions (720, 704, 640, 544, 480, 352) in both 625 and 525 line operation. 352 supports full and half-vertical resolution in both 625 and 525 line operation

[8] 4:2:2 is only available when software option M2/ESO2/422 is purchased.
[9] Error detection and handling is not currently supported.
[10] Bit-rates lower than 1.5 Mbit/s are only available when the software option M2/ESO2/PU is purchased.

- Fully exhaustive motion estimation
- An internal frame synchroniser (see *Internal Frame Synchroniser* on *Page 1-10*)
- Support for Active Format Descriptor (AFD) (see *Chapter 4, Operating the Equipment Locally, Table 4.36*)
- Support for a variety of Group of Pictures (GOP) structures with a variable number of B frames
- Built-in patented adaptive noise reduction circuitry[11]
- A logo overlay facility whereby the Encoder is able to overlay broadcasters trademarks/logos onto the active video

Motion Estimation

Fully Exhaustive motion estimation is used. It takes a macro block of 16 pixels x 16 pixels and then performs an exhaustive search without subsampling.

Variable Video Bit-rate

The MPEG-2 compression algorithm uses adaptive field/frame coding, forward and backward predictive processing with motion estimation and compensation to reduce the bit-rate to the range shown in *Table 1.3*.

Table 1.3: Video Bit-rate Range [12]

Video Encoding Mode	
4:2:0	4:2:2[13]
1.5 Mbit/s - 15 Mbit/s	1.5 Mbit/s - 50 Mbit/s

> NOTE...
> Minimum bit-rate is 0.25 Mbit/s when software option M2/ESO2/PU is purchased.

Coding Resolutions

To provide optimum picture quality over the full range of supported bit-rates, the encoded picture resolution is controlled automatically according to the video bit-rate. Alternatively, the user can override this and select manual control, if desired. Coding resolutions are shown in *Table 1.4*.

[11] Noise reduction is only available when software option M2/ESO2/NR is purchased.
[12] The video bit-rate depends on the Multiplexer bit-rate which is set.
[13] 4:2:2 is only available when software option M2/ESO2/422 is purchased.

Table 1.4: Video Coding Resolutions

625 Line Modes	525 Line Modes
720 pixels x 576 lines	720 pixels x 480 lines
704 pixels x 576 lines	704 pixels x 480 lines
640 pixels x 576 lines	640 pixels x 480 lines
544 pixels x 576 lines	544 pixels x 480 lines
480 pixels x 576 lines	480 pixels x 480 lines
352 pixels x 576 lines	352 pixels x 480 lines
352 pixels x 288 lines	352 pixels x 240 lines

Internal Frame Synchroniser

An internal frame synchroniser is provided to accommodate slight differences between the incoming frame rate and that generated by the stable reference[14] used by the Encoder.

Output on Video Loss

The Encoder can be software-configured to show, in the event of video input loss, either:

- A test pattern (with or without ident text)
- A freeze frame (with or without ident text)
- Cut to a black screen (with or without ident text)

1.3.2 Audio Encoding

General

Audio can be encoded to:

- MPEG-1 Audio (layer 2) standard (sampling rate 32 kHz or 48 kHz).
- Dolby Digital (AC-3)[15] (sampling rate 32 kHz or 48 kHz)[16].

  Output bit-rate is selectable in the range 32 kbit/s - 384 kbit/s (dependent on configuration) for MPEG-1 Audio (layer 2) and 56 kbit/s - 640 kbit/s (dependent on configuration) for Dolby Digital (AC-3) coding mode selectable between 1/0 and 2/0.
- Dolby Digital (AC-3) pre-encoded audio (IEC 61937 specification) in pass-through mode is also available (it only operates at 48 kHz). This is where an audio stream has already been encoded externally, prior to entering the Encoder.
- Linear PCM[16] (SMPTE 302M).
- Dolby E Pass-through[16].

> NOTES...
>
> 1. See *Annex G, Audio Modes* for details of setting up the audio.
> 2. MPEG-1 audio sampling rate is fixed at 48 kHz when controlled from the front panel.

[14] To ensure broadcast quality it is recommended that the studio reference is fed to HYSNC.
[15] Dolby Digital (AC-3) is only available when software option M2/ESO2/AC3 is purchased.
[16] To achieve lip sync in all modes the audio option M2/EOM2/AUDLIN must be used

Audio Inputs

The standard audio input is:

- **AUDIO IN** – 15-way male D-type - software selectable balanced analogue or digital AES/EBU, with AES/EBU on left only. A break-out cable is supplied which plugs into this connector and provides a more convenient means of connecting the audio inputs via five connectors. There are four XLR female connectors, with the fifth cable being a BNC which provides an AES/EBU 75 Ω digital reference output.
- Alternatively, audio can be input embedded as AES/EBU on the serial digital interface (**SDI**). In this mode a maximum of four stereo pairs can be extracted from any two Data Identifiers (DIDs). Audio may be converted to either of the standard output sampling frequencies, 32 kHz or 48 kHz, by use of the built-in asynchronous sample rate converters. This applies only to audio which is not pre-encoded.

Audio Channels

The Encoder Base Board is capable of processing two stereo pairs, from any of the following[17]:

- SDI Embedded source
- Digital source AES/EBU
- Analogue source, termination impedance 600 Ω or 20 kΩ

These signals may be processed using the encoding modes in the following section.

MPEG Encoding Modes

The two stereo pairs may be configured in various encoding modes:

- **Single mono:** the left channel is encoded - the signal is output to both XLR connectors at the receiving end. Not available in Linear PCM.
- **Dual mono:** the left and right signals are encoded and carried in the transport stream as a single Packetised Elementary Stream (PES) data stream. The way that the left and right signals are output from the Receiver is dependent on how the routing is set up on the Receiver. Both the left and the right may be output, or the left only, or the right only. This is typically used for multilingual services. Available in MPEG-1 (layer 2) and Linear PCM.
- **Stereo:** A stereo pair is coded as two mono signals - the two signals are output as stereo at the receiving end.
- **Joint stereo:** A stereo pair is coded taking advantage of the stereo nature of the channels - the two signals are output as stereo at the receiving end. Available in MPEG-1 (layer 2) only.
- **Audio Description Service**

Dolby Digital (AC-3) Encoding Modes

- **1 / 0:** centre
- **2 / 0:** left and right

[17] See *Annex G, Audio Modes* for details of setting up the audio.

Test Tones

The equipment can be configured to generate a test tone for alignment purposes. Refer to *Annex B, Technical Specification* for level and frequency.

Audio Variable Bit-rate

MPEG-1 audio output bit-rate (see *Table 1.5*) is selectable in the range 32 kbit/s -384 kbit/s (dependent on configuration).

Table 1.5: MPEG-1 Audio Encoding Bit-rates

Bit-rate (kbit/s)	Single Channel Mono	Dual Mono	Stereo	Joint Stereo
32	✓	-	-	-
48	✓	-	-	-
56	✓	-	-	-
64	✓	✓	✓	✓
80	✓	-	-	-
96	✓	✓	✓	✓
112	✓	✓	✓	✓
128	✓	✓	✓	✓
160	✓	✓	✓	✓
192	✓	✓	✓	✓
224	-	✓	✓	✓
256	-	✓	✓	✓
320	-	✓	✓	✓
384	-	✓	✓	✓

Dolby Digital (AC-3)

Dolby Digital (AC-3) audio encoding incorporates digital normalisation, preprocessing (filtering), dynamic range compression and the addition of bit-stream information.

Dolby Pro Logic audio can be carried as stereo audio through the Encoder as long as a suitably high bit-rate is selected.

Table 1.6: Dolby Digital Audio Encoding Bit-rates

Bit-rate (kbit/s)	Single Channel Mono (1/0)	Dual Channel Stereo (2/0)
56	✓	-
64	✓	-
80	✓	-
96	✓	✓
112	✓	✓
128	✓	✓
160	✓	✓
192	✓	✓
224	✓	✓
256	✓	✓
320	✓	✓
384	✓	✓
448	✓	✓
512	✓	✓
576	✓	✓
640	✓	✓

1.3.3 Vertical Blanking Interval (VBI) Line Processing Modes

Introduction

The Encoder has three modes for processing VBI lines.

> NOTE...
> A maximum of eight VBI lines per field may be extracted. This limit does not apply to Teletext.

VBI in Picture

By selecting the VBI in Picture extended active picture format available in the MPEG 4:2:2 specification the Encoder compresses and transmits the VBI data as part of the active picture. This mode requires up to 3 Mbit/s of extra bit-rate, depending on the amount and complexity of the VBI present.

> NOTES...
> 1. VBI in Picture transmits the VBI waveform as part of the picture and as such will be subject to some distortion. Most analogue VBI types are robust against this type of distortion but others, e.g. video index, are intended for SDI transmission and will not survive MPEG coding/decoding in VBI in Picture mode. VITS test signal and ghost cancellation signal will become corrupted.
> 2. VBI in Picture is not supported when 3:2 Pulldown is active.

VBI User Data

Closed Caption data, together with other formats such as VITC and AFD, can be transmitted in the user data field of the video or relevant part of the video stream.

VBI in PID

The Encoder has the ability to extract and transmit a wide variety of VBI line formats. Circuitry on the front end of the equipment incorporates a number of general purpose line grabbers so that known formats of VBI data can be extracted.

The following VBI data formats are supported:

- Line 21 (field 1 and field 2) data Services EIA-608 (Closed Caption and V-chip)
- Neilson AMOL 1, Neilson AMOL 11
- VITC (EBU and SMPTE)
- Programme Delivery Control (PDC), via ITU-R system B Teletext extension data packets of type 8/30, format 2 and Line 16 Video Programme System (VPS). Video Programming Teletext (VPT) and VPS are trade names
- Wide Screen Signalling (WSS) (line 23) ETS 300 294
- Video Index (for Pan Scan, Aspect Ratio and Active Format Descriptor)
- The supported VBI line number range is 10-22 and 272-285 for 525 lines and 7-24 and 319-336 for 625 lines

Teletext Extraction

The Encoder supports internal Teletext data extraction (Teletext drop) from the VBI of a video input and formats this data into a transport packet, as specified in the DVB specification EN300-472. The Encoder can extract up to 18 lines of Teletext from each field of the video frame.

Line filters can be invoked to selectively disable any individual lines in this range. The filters are provided to allow the user to ensure that non-Teletext lines (e.g. ITS lines) are not erroneously extracted. The extracted Teletext lines are formatted into PES packets according to the DVB specification. The Teletext PES packets are time-stamped to allow correct alignment of subtitling captions with decoded video.

The following Teletext services are extractable:

- Sytem B (WST) Teletext
- Video Programming Teletext (VPT), PDC (Packet 8/30 format 2)
- Inverted Teletext

1.3.4 Data Channels

The basic Encoder supports two data channels, an asynchronous RS-232 and a synchronous RS-442. These are provided as data pipes only, they are not time-stamped.

1.3.5 Outputs

Three ASI-C (copper) outputs supplying a DVB and ATSC[18] MPEG-2 transport stream are supplied as standard.

1.3.6 IF Modulation

E5714

The internal satellite modulator within the E5714 supports QPSK modulation in accordance with EN 300 421 (DVB-S). It provides a main and monitoring IF Output. The IF frequency can be tuned between 50 MHz and 90 MHz in steps of 125 kHz. The maximum symbol rate is 30 Msym/s 60 MHz to 80 MHz (20 Msym/s at 50 MHz and 90 MHz).

E5740

The satellite modulator fitted within the E5740 is capable of QPSK modulation in accordance with EN 300 421 (DVB-S), and is also capable of 8PSK and 16QAM modulation in accordance with EN 301 210 (DVB-DSNG). It is available with either IF outputs, or L-band outputs.

The IF output frequency can be tuned between 50 MHz and 180 MHz in 1 kHz steps. The L-band output frequency can be tuned between 950 MHz and 1750 MHz in 1 kHz steps. The maximum symbol rate is 48 Msym/s.

E5715/E5750

The OFDM modulator fitted within the E5715 and E5750 provides an IF output at 70 MHz and 0dBm. It is capable of operating in 2k carriers, or 8k carriers transmission modes. It supports FEC rates of ½, $^{2}/_{3}$, ¾, $^{5}/_{6}$ and $^{7}/_{8}$, and guard intervals of $^{1}/_{32}$, $^{1}/_{16}$, $^{1}/_{8}$, and ¼. It can provide QPSK, 16QAM, or 64QAM modulation schemes.

1.3.7 Control and Monitoring

Remote control of the Encoder is via the Ethernet network running the Simple Network Management Protocol (SNMP) protocol or via the RS-232/RS-485 remote control port.

Alternatively, Local control is implemented through the front panel keypad and display.

1.3.8 Options and Upgrades

Options and Upgrades are described in *Chapter 3, Options and Upgrades*.

[18] ATSC internal PSIP generation is not supported in Build versions 2.1.0 and 2.2.0.

1.4 Guided Tour

1.4.1 Enclosure

There are two sizes of enclosure, 1U and 2U versions. The enclosure is used as a stand-alone unit. All inputs and outputs are via rear panel connectors.

1.4.2 The User Interface

The Encoder itself provides no controls at the rear panel but there is a display and keypad at the front panel. All connectors are provided at the rear panel. Control and monitoring may be performed in a variety of ways (see *Section 1.3.7, Control and Monitoring*). Once configured, the system runs without the need for further intervention unless system configuration requirements change.

1.4.3 Front Panel Description

Front Panel Display, Navigation Keys, Softkeys, Keyboard

The 1U Encoder provides navigation keys to access and input data. The 2U Encoder provides a keypad and softkeys to access and input data. There are two LED indicators, located on the left of the front panel (see *Figure 1.7* and *Figure 1.9*).

The front panel display and navigation keys/softkeys/keyboard are used as a local control method to set up and configure the Encoder (see *Chapter 4, Operating the Equipment Locally*). They can also be used as quick method for accessing the status of the equipment.

Table 1.7: Front Panel Indicators

Indicator	Colour	Description
Alarm	Red	This LED is lit when an alarm condition has been detected by the Encoder.
Power	Green	This LED is lit when power is being received by the Encoder.

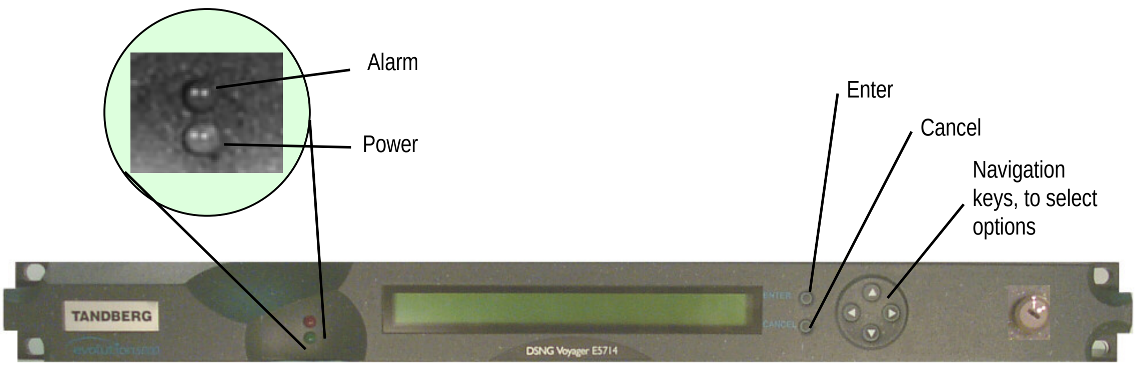


Figure 1.7: 1U Encoder Front Panel Indicators

Power Supply Stand-by Switch

The use of this switch puts the Encoder into stand-by mode. It powers down the supply rails of the display and internal circuits within the unit. The switch type avoids accidental powering-down of the Encoder. For normal use ensure that the **I** is always at the top (see *Figure 1.8*).

> WARNING...
>
> THIS IS NOT A MAINS SWITCH AND DOES NOT ISOLATE THE ENCODER FROM THE POWER SUPPLY.

> NOTE...
>
> Earlier versions of the 1U Encoder may not have this switch fitted.

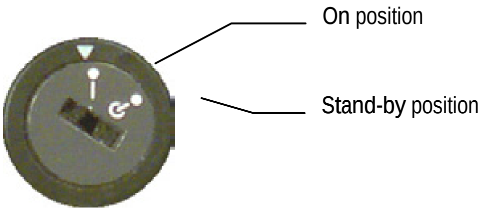


Figure 1.8: Stand-by Switch

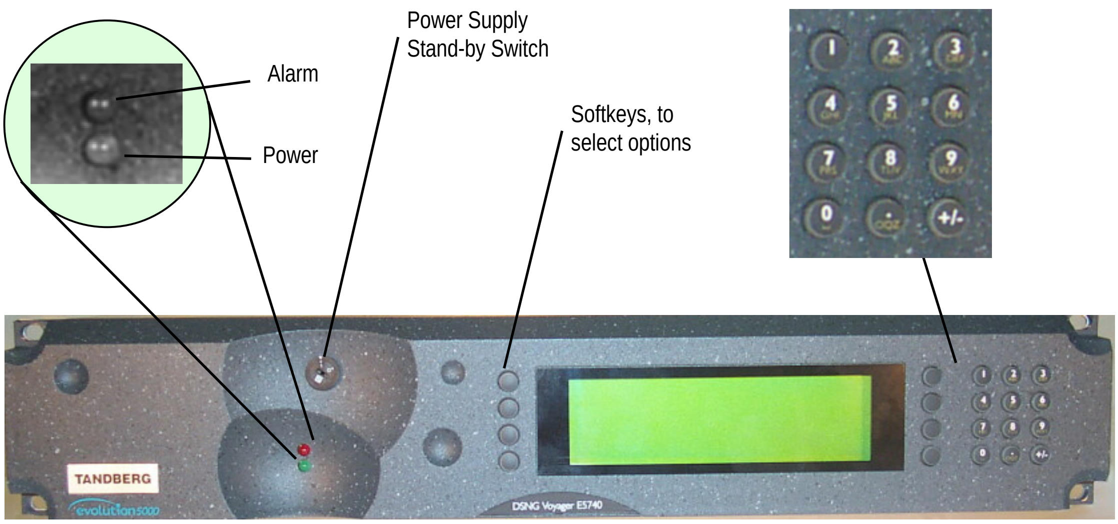


Figure 1.9: 2U Encoder Front Panel Indicators

1.4.4 Rear Panel Description

Introduction

The Encoder provides connectors at the rear panel. All, except the power connector, are physically located on the separate modules which comprise the Encoder.

1U Chassis

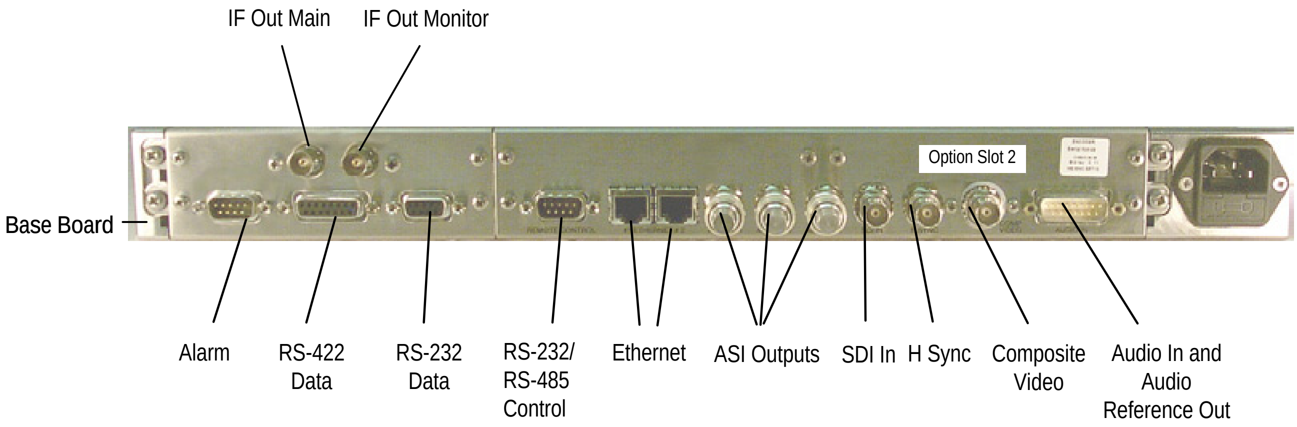


Figure 1.10: E5714 (1U) Rear Panel Component Parts and Connectors

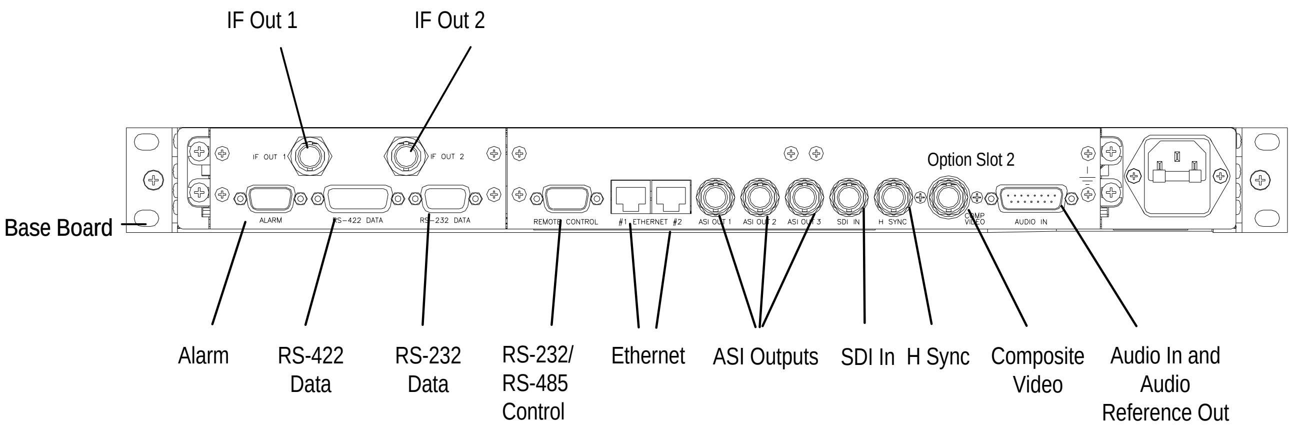


Figure 1.11: E5715 (1U) Rear Panel Component Parts and Connectors

2U Chassis

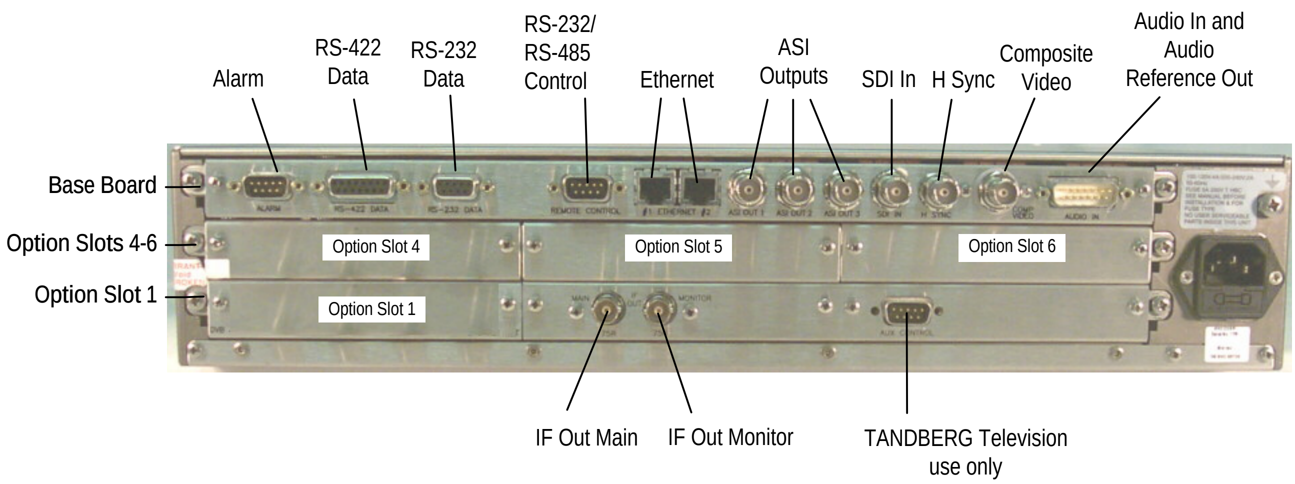


Figure 1.12: E5740 (2U) Rear Panel Component Parts and Connectors

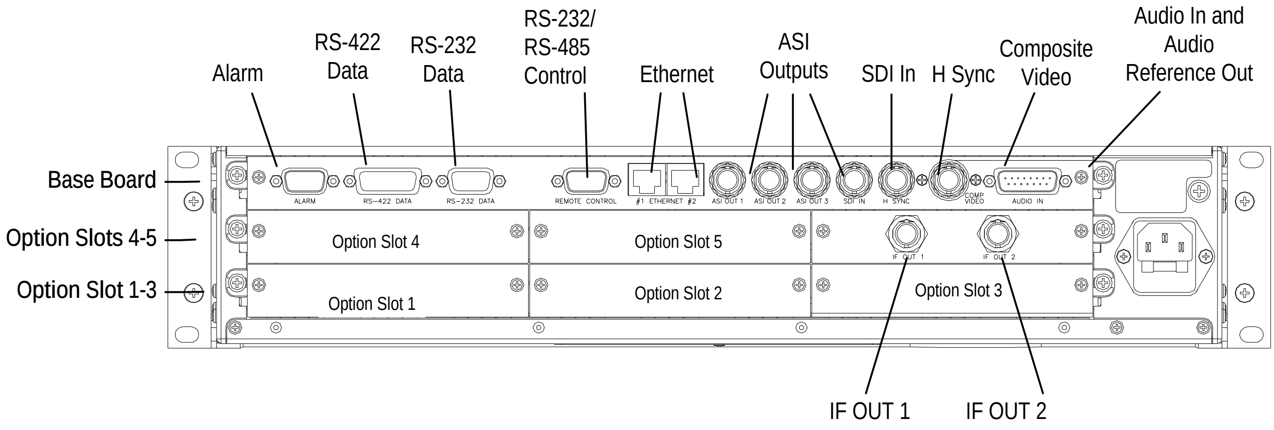


Figure 1.13: E5750 (2U) Rear Panel Component Parts and Connectors

1.4.5 Boards in the Basic Encoder

The basic Encoder contains two boards mounted horizontally in the enclosure (see *Table 1.8*). Option modules can be fitted in the remaining slots (see *Equipment Models* on *page 1-3* and *Chapter 3, Options and Upgrades*).

Table 1.8: Boards in the Basic Encoder

Model Number	Card
E5714	S11171 Encoder Base Board
	S12376 Tuneable QPSK Modulator
E5715	S11171 Encoder Base Board
	S12524 OFDM Modulator
E5740-IF	S11171 Encoder Base Board
	S10872 70/140 MHz Satellite Modulator
E5740-LBAND	S11171 Encoder Base Board
	S12695 L-Band Satellite Modulator
E5750	S11171 Encoder Base Board
	S12524 OFDM Modulator

Access to the modules or boards in the basic Encoder is not required for normal operation and may invalidate the warranty.

BLANK

Chapter 2

Installing the Equipment

Contents

List of Figures

List of Tables

2.1 Introduction

2.1.1 Read This First!

The Encoder must be handled carefully and thoughtfully to prevent safety hazards and damage. It is usually supplied as part of a system installed by TANDBERG Television engineers. In any case, ensure the personnel designated to install the unit have the appropriate skills and knowledge. If in any doubt, contact Customer Services.

Follow the instructions for installation and only use installation accessories recommended by the manufacturers.

2.1.2 General

Installation of the Encoder is normally performed by TANDBERG Television personnel. This chapter provides configuration and connection information for planning installations, checking the final set-up in the event of a fault, modifying the requirements or moving the equipment to another location. In the event of problems, contact Customer Services.

2.1.3 Site Requirements

Power Supplies

See *Annex B, Technical Specification* for a full specification.

Environment

See *Annex B, Technical Specification* for a full specification.

Do not install this product in areas of high humidity or where there is danger of water ingress.

Lightning Protection

WARNING...

IF THE ENCODER HAS BEEN SUBJECT TO A LIGHTNING STRIKE OR POWER SURGE WHICH HAS STOPPED IT WORKING, DISCONNECT THE POWER IMMEDIATELY. DO NOT REAPPLY POWER UNTIL IT HAS BEEN CHECKED FOR SAFETY. IF IN DOUBT, CONTACT TANDBERG TELEVISION CUSTOMER SERVICES.

Where appropriate, ensure this product has an adequate level of lightning protection. Alternatively, during a lightning storm or when it is left unattended and unused for long periods of time, unplug it from the supply outlet and disconnect the output equipment. This prevents damage to the product due to lightning and power line surges.

2.1.4 EMC Compliance Statements[1]

EN 55022 / AS/NZS 3548

This equipment is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

[1] The EMC information was correct at the time of manufacture. The EMC tests were performed with the Technical earth attached.

FCC

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

2.2 Preliminary Checks

2.2.1 Mechanical Inspection

When taking delivery of an Encoder, check the equipment items delivered against the enclosed delivery note. Inspect the equipment for damage in transit. If in doubt, contact Customer Services (see *Preliminary Pages*).

> NOTE...
> Do not remove the covers of this equipment as doing so may invalidate any warranties, cause a safety hazard and/or affect the EMC performance. It may also invalidate any safety tests. Check with Customer Services beforehand.

2.2.2 Moving the Equipment Safely



Do not place this product on an unstable cart, stand, bracket, or table. The product may fall, causing serious injury and serious damage to the product. Use only with a cart, stand, bracket or table recommended by TANDBERG Television.

An appliance and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the appliance and cart combination to overturn.

Do not move or carry the equipment whilst it is still connected to the supply or other leads, is live or is in operation.

2.3 Installing the Equipment

2.3.1 Fixing Method

The Encoder can be operated mounted in a 19-inch rack. Ensure that it is firmly and safely located and has an adequate through-flow of air.

Slide the Encoder onto the chassis supports and affix to the rack by means of an M6 x 18 mm panhead screw in each corner (see *Figure 2.1*).

Do not use this product as a support for any other equipment.

Location of screws to attach Encoder to rack.
Same at the opposite side of the Encoder.



Figure 2.1: Fitting the Encoder into a Rack

2.3.2 Cable Routing

Power supply cables should be routed so that they are not likely to be walked on or pinched by items placed upon or against them. Pay particular attention to cables at plugs, convenience receptacles, and the point where they exit from the appliance.

Do not run ac power cables in the same duct as signal leads.

2.3.3 Equipment Access

WARNING...

BERYLLIUM COPPER FINGER STRIPS ARE USED IN THIS EQUIPMENT TO SEAL THE ENCLOSURE FOR EMI PROTECTION. THIS ARRANGEMENT IS PERFECTLY SAFE DURING NORMAL OPERATION. DO NOT FILE THE STRIPS OR OTHERWISE CAUSE THEM TO PRODUCE DUST OR PARTICLES. ANY CUTS CAUSED BY THE STRIP SHOULD BE TREATED APPROPRIATELY.

Ensure that the Encoder is installed in such a way as to allow access to the rear of the unit and the connectors.

2.3.4 Ventilation

WARNING...

NEVER PUSH OBJECTS OF ANY KIND INTO THIS EQUIPMENT THROUGH OPENINGS AS THEY MAY TOUCH DANGEROUS VOLTAGE POINTS OR SHORT-OUT PARTS THAT COULD RESULT IN A FIRE OR ELECTRIC SHOCK. NEVER SPILL LIQUID OF ANY KIND ON THE PRODUCT.

CAUTIONS...

1. Openings in the cabinet are provided for ventilation and to ensure reliable operation of the product and to protect it from overheating, and these openings must not be blocked or covered. This product should never be placed near or over a radiator or heat register. This product should not be placed in a built-in installation such as a rack unless proper ventilation is provided or the instructions have been adhered to.
2. Do not install equipment so that the air intake of one aligns with the outlet on another. Provide baffles and adequate spacing.
3. The fans contained within this unit are not fitted with a dust/insect filter. Pay particular attention to the environment in which it is to be used.

The unit is designed for stationary or fixed use only. Ensure it is firmly and safely located and has an adequate through-flow of air. Allow at least 50 mm free air-space at each side of the equipment. Units in racks can be stacked without ventilation panels between. Racks containing stacked equipment may need to be forced-air cooled to reduce the operating ambient temperature. For stacking constraints contact Customer Services.

The 1U Encoder uses a similar air-flow path, with three fans on each side of the unit. With both 1U and 2U units it is important not to block the front air intake on the bottom-left corner of the front panel (see *Figure 2.2*).

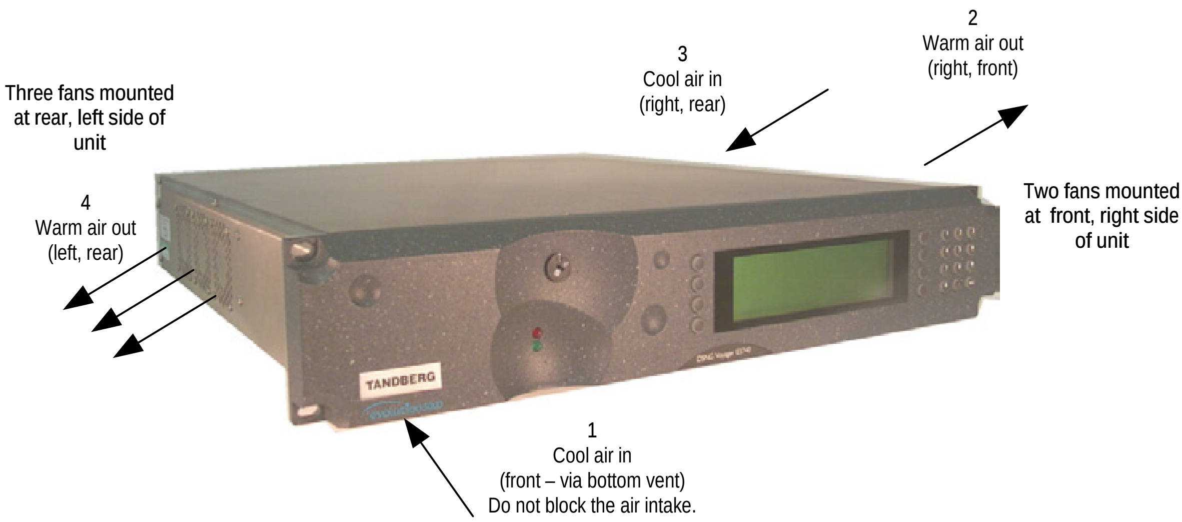


Figure 2.2: Air Path Through the Enclosure

2.4 AC Mains Operating Voltage and Earthing

2.4.1 AC Power Supply

> CAUTION...
>
> This product should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supply to your business, consult a qualified electrical engineer or your local power company.

See *Annex B, Technical Specification* for a full power supply specification. There are no links or switches to be altered for operation from different ac supplies.

2.4.2 Power Cable and Earthing

General

Check that the ac power cable is suitable for the country in which the Encoder is to be used.

> WARNINGS...
>
> 1. IF THE MOULDED PLUG FITTED TO THE MAINS CABLE SUPPLIED WITH THIS UNIT IS NOT REQUIRED, PLEASE DISPOSE OF IT SAFELY. FAILURE TO DO THIS MAY ENDANGER LIFE AS LIVE ENDS MAY BE EXPOSED IF THE REMOVED PLUG IS INSERTED INTO A MAINS OUTLET.
> 2. POWER-SUPPLY CORDS SHOULD BE ROUTED SO THAT THEY ARE NOT LIKELY TO BE WALKED ON OR PINCHED BY ITEMS PLACED UPON OR AGAINST THEM, PAYING PARTICULAR ATTENTION TO CORDS AT PLUGS, CONVENIENCE RECEPTACLES, AND THE POINT WHERE THEY EXIT FROM THE APPLIANCE.

The unit is supplied with three, detachable mains-supply cables fitted with moulded plugs suitable for the USA, UK or Europe.

The wires in the mains cable are coloured in accordance with the wire colour code shown in *Table 2.1*.

Table 2.1: Supply Cable Wiring Colours

	UK (BS 1363)	EUROPE (CEE 7/7)	USA (NEMA 5-15P)
Earth:	Green-and-yellow	Green-and-yellow	Green
Neutral:	Blue	Blue	White
Live:	Brown	Brown	Black

Protective Earth / Technical Earth

> WARNINGS...
>
> 1. THIS UNIT MUST BE CORRECTLY EARTHED THROUGH THE MOULDED PLUG SUPPLIED. IF THE LOCAL MAINS SUPPLY DOES NOT HAVE AN EARTH CONDUCTOR DO NOT CONNECT THE UNIT. CONTACT CUSTOMER SERVICES FOR ADVICE.
> 2. BEFORE CONNECTING THE UNIT TO THE SUPPLY, CHECK THE SUPPLY REQUIREMENTS IN ANNEX B.

The unit has a Technical earth terminal (marked with ⏚) located at the rear panel. Its use is recommended. This is **NOT** a Protective earth for electric shock protection. The terminal is provided to:

1. Ensure all equipment chassis fixed within a rack are at the same Technical earth potential. To do this, connect a wire between the Technical earth terminal and a suitable point on the rack.
2. Eliminate the migration of stray charges when connecting between equipment.

> WARNING...
>
> IF THE TERMINAL SCREW HAS TO BE REPLACED, USE THE FOLLOWING:
>
> 1U ENCODER - M4 X 10 mm LONG POZIDRIV PANHEAD.
>
> 2U ENCODER - M5 X 12mm LONG POZIDRIV PANHEAD.
>
> USING A LONGER SCREW MAY CAUSE A SAFETY HAZARD.

Connecting the Encoder to the AC Power Supply

> WARNINGS...
>
> 1. DO NOT OVERLOAD WALL OUTLETS AND EXTENSION CORDS AS THIS CAN RESULT IN A RISK OF FIRE OR ELECTRIC SHOCK.
> 2. AS NO MAINS SWITCH IS FITTED TO THIS UNIT, ENSURE THE LOCAL AC POWER SUPPLY IS SWITCHED OFF BEFORE CONNECTING THE SUPPLY CORD.
> 3. THE ENCODER IS NOT FITTED WITH AN ON/OFF SWITCH. ENSURE THAT THE SOCKET-OUTLET IS INSTALLED NEAR THE EQUIPMENT SO THAT IT IS EASILY ACCESSIBLE. FAILURE TO ISOLATE THE EQUIPMENT PROPERLY MAY CAUSE A SAFETY HAZARD.

To connect the unit to the local ac power supply:

1. Ensure the local ac supply is switched OFF.
2. Ensure the correct fuse type and rating has been fitted to both the equipment and the ac power cable.
3. Connect the ac power lead to the Encoder mains input connector and then to the local mains supply.

2.5 DC Operating Voltage and Earthing

2.5.1 DC Power Supply

> WARNING...
>
> THE ENCODER IS NOT FITTED WITH AN ON/OFF SWITCH. PROVIDE AN ACCESSIBLE, EXTERNAL MEANS OF DISCONNECTION. FAILURE TO ISOLATE THE EQUIPMENT PROPERLY MAY CAUSE A SAFETY HAZARD.

> CAUTIONS...
>
> 1. This product should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supply where the Encoder is to be mounted, consult a qualified electrical engineer for the vehicle, the vehicle manufacturer or their agents.
> 2. The Encoder can be connected to a positive or negative earth system but you must ensure that correct polarity to the DC input connections are maintained.

The internal dc power supply module used in this equipment is designed for use on dc supplies ranging from 12 to 36 volts dc. (see *Annex B, Technical Specification* for a full power supply specification).

The dc connections within the Encoder are floating (both are isolated from the Encoder case and earth connection). Refer to the previous caution regarding voltage polarity.

The recommended types of dc power sources are as follows:

- Battery with suitable fuse protection
- Linear PSU capable of 12 A with a peak of 30 A
- Switched-mode PSU capable of 12 A with a peak of 30 A

NOTES...

1. The voltages specified are those required at the Encoder DC INPUT terminals when the unit is powered on, therefore any cable voltage drop must be taken into account at the time of installation.
2. In situations where the Encoder is battery powered and remote from a charging source, two 12 volt batteries wired in series are recommended, to avoid the voltage dropping to a level where the Encoder switches off.
3. Ensure that the non-earthed side connection of the dc supply is protected by a suitably rated (30 A) external fuse.

CAUTION...

The Encoder requires a minimum of 12 volts to power up and has a low voltage shutdown facility that operates at approximately 11 volts. This is part of the power unit's design. Failure to observe the equipment voltage requirements may result in power cycling of the Encoder if the battery is unable to maintain its terminal voltage. Damage may result if this condition is allowed to continue.

2.5.2 DC Power Cable and Earthing

General

The Encoder is supplied with a two metre, three-way cable terminated with a three way shrouded socket at one end and prepared tails at the other.

Although the Encoder consumes less than 20 A, the use of 20 A rated cable is recommended in order to minimise voltage drop from the dc supply.

The socket has one large and four small key-ways. The large key-way is positioned at the bottom of the connector. Offer the cable connector to the front panel connector as follows:

1. Check that the connector collar is in one of its click positions.
2. With the large key-way at the bottom and pin 2 at the top, push the line connector home.
3. Push the knurled collar forward against the collar's internal spring and rotate it to the right until it locates in the detents, the connection is now complete.

Check that the dc power connections are of sufficient capacity for the current required by the Encoder.

WARNING…

THE POWER-SUPPLY CABLE SHOULD BE ROUTED SO THAT IT IS NOT LIKELY TO BE DAMAGED OR TRAPPED BY ITEMS PLACED UPON OR AGAINST IT, PAYING PARTICULAR ATTENTION TO THE CABLE AT CONNECTION POINTS.

DC Power Connector (Encoder)

The wires in the dc power cable are coloured in accordance with the wire colour code shown in *Table 2.2.*

Table 2.2: DC Input Connector and Cable details

Plug/Socket	Wire Colour	Voltage Condition
Jaeger C type		
Pin 1:	Green/Yellow or Green	Earth/Vehicle frame
Pin 2:	Brown or Red	+V
Pin 3:	Blue or Black	–V



2.6 Signal Connections For the Basic Unit

2.6.1 Introduction

All signal connectors are located at the rear panel of the Encoder. For a detailed interface specification see *Annex B, Technical Specification*.

Always use the specified cables supplied for signal integrity and compliance with EMC requirements (see *Annex B, Technical Specification*).

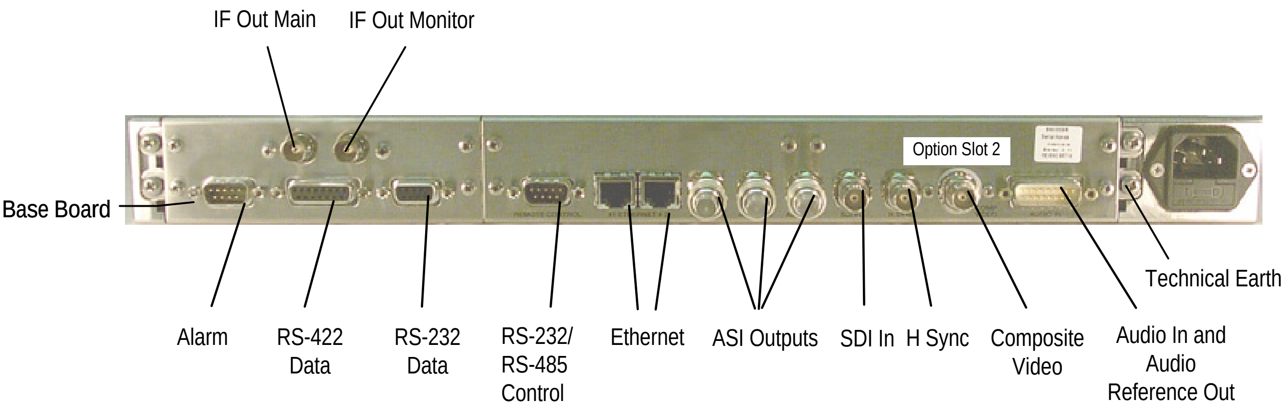


Figure 2.3: E5714 (1U) Rear Panel Component Parts and Connectors

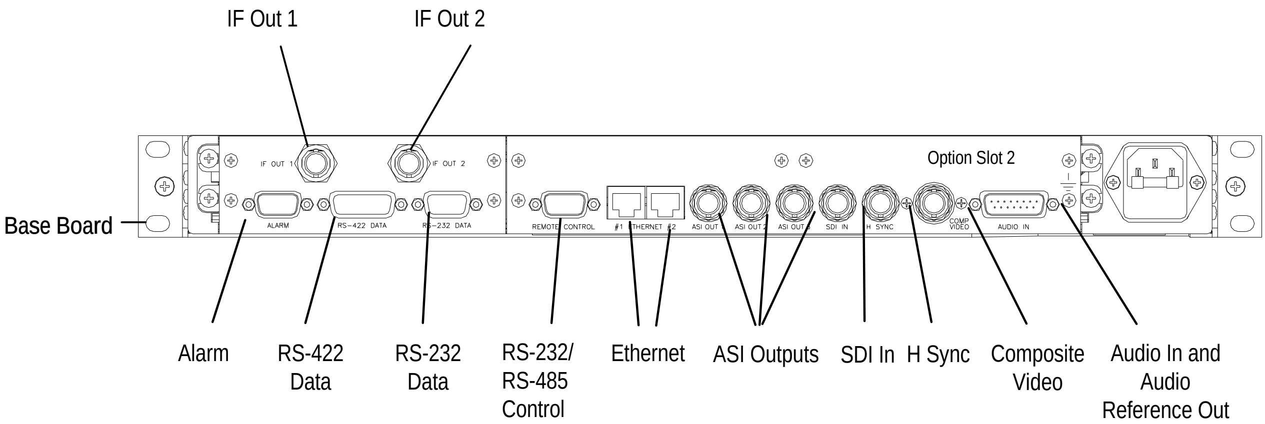


Figure 2.4: E5715 (1U) Rear Panel Component Parts and Connectors

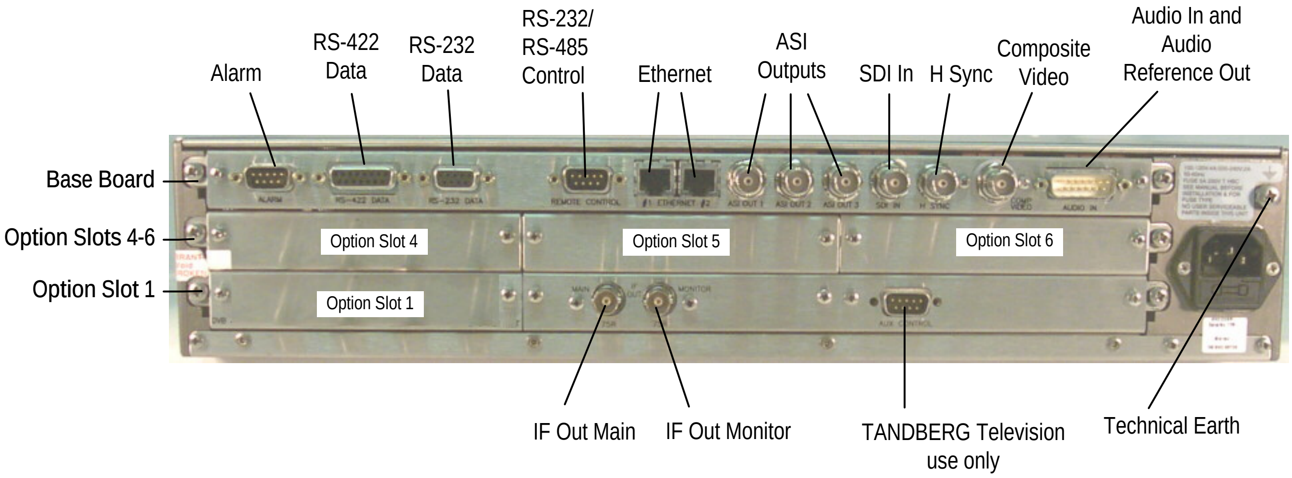


Figure 2.5: E5740-IF (2U) Rear Panel Component Parts and Connectors

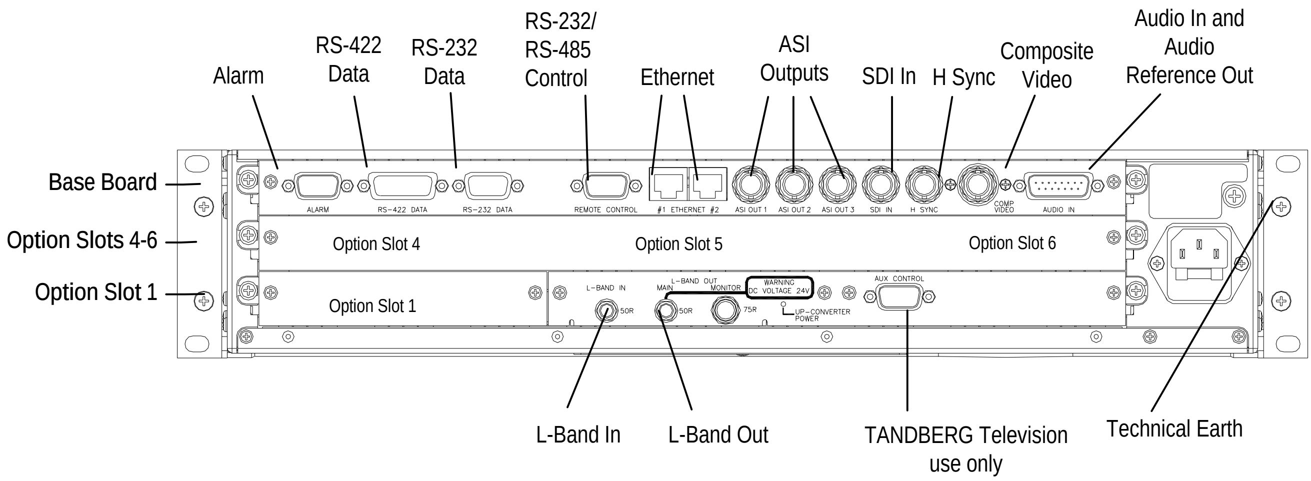


Figure 2.6: E5740-L-Band (2U) Rear Panel Component Parts and Connectors

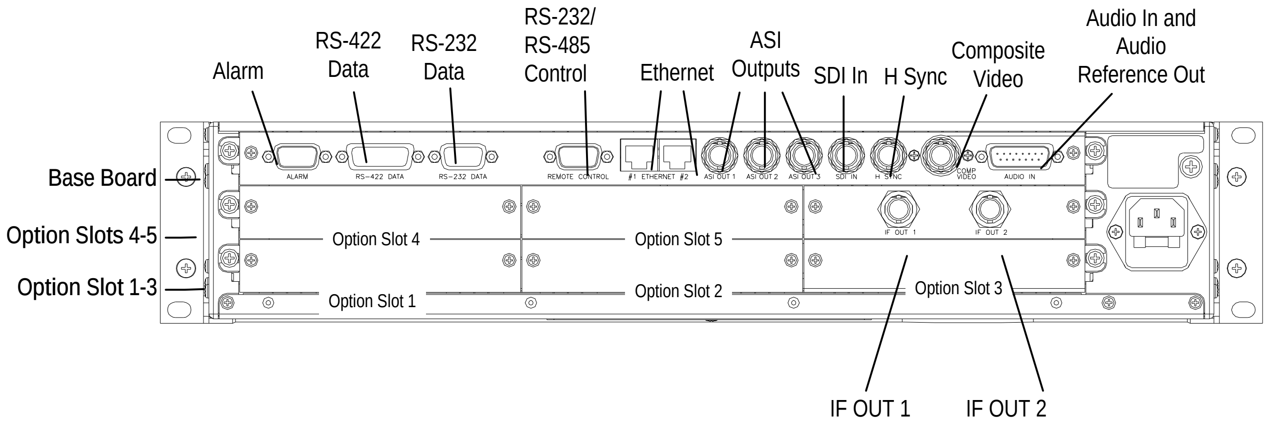


Figure 2.7: E5750 (2U) Rear Panel Component Parts and Connectors

2.6.2 Connecting Up the Basic Encoder

Once the unit has been installed in its intended operating position, it is ready to be connected up to the rest of the system equipment (see *Figure 2.8*), providing it too has been installed (see *Section 2.5, DC Operating Voltage and Earthing* for pin-out details of the connectors).

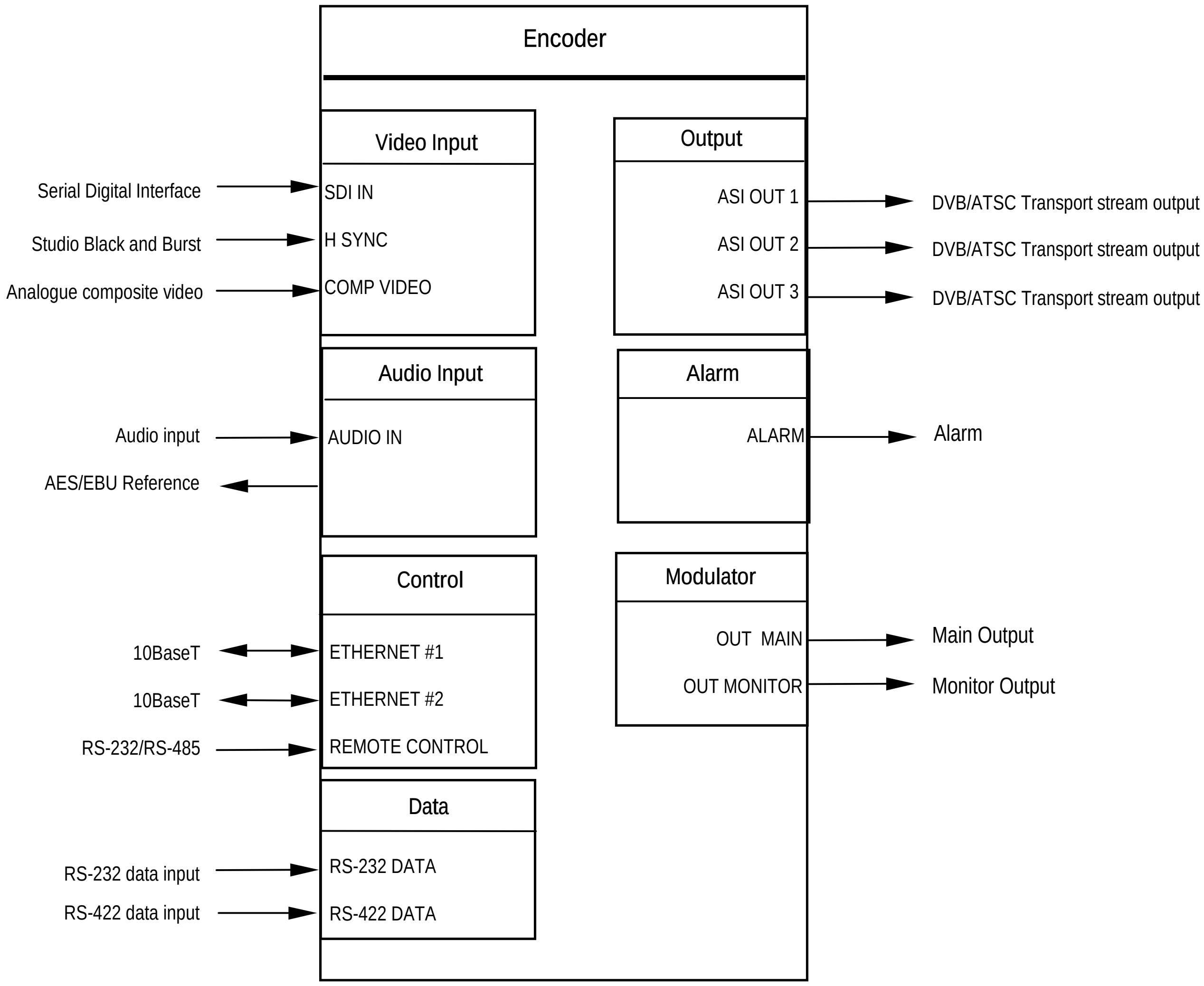


Figure 2.8: Equipment Connections for the Basic Unit

Do not move or install equipment whilst it is still attached to the mains supply. Ensure ESD precautions are observed whilst interconnecting equipment.

> NOTE...
> See *Chapter 3* for information relating to Options and Upgrades.

2.6.3 Power Supply

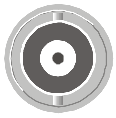
Section 2.4, AC Mains Operating Voltage and Earthing provides details of power supply connection, Protective earthing and safety. Read all the instructions carefully and take note of all warnings and cautions. Also, see *Section 2.5, DC Operating Voltage and Earthing*.

2.6.4 Technical Earth

Connect the Encoder's Technical earth to a suitable point.

2.6.5 Video Inputs

SDI IN



A 75 Ω BNC connector provides a serial digital video input to the unit. See *Chapter 4, Operating the Equipment Locally, Video Input Option* for the types of video and selection method. This input is terminated in 75 Ω.

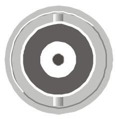
The serial input supports error detection and handling (EDH) as defined by the specification SMPTE RP 165-1994, ‘Error Detection Checkwords and Status Flags for Use in Bit Serial Digital Interfaces for Television’.

For more information about EDH refer to *Annex K, EDH Capability for E57xx Encoders*.

Table 2.3: SDI Connector

Pin	Signal
Centre	Video Input
Screen	Ground
Impedance	75 Ω

H SYNC

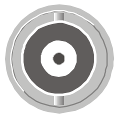


Studio Black and Burst should be fed to the 75 Ω BNC connector (H SYNC). This will then genlock the Encoder to the Studio system. This method may be required with some audio formats, or for locking Encoders to an evolution *5000* Multiplexer. For details on the genlocking system see *Annex G, Audio Modes*.

Table 2.4: H SYNC Connector

Pin	Signal
Centre	Video Input
Screen	Ground
Impedance	75 Ω

COMP VIDEO



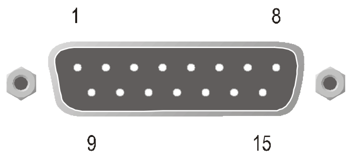
A 75 Ω BNC connector provides a high quality analogue video input to the unit. See *Chapter 4, Operating the Equipment Locally, Video Input Option* for the types of video and selection method.

> NOTE...
> The input is differential to prevent 50 Hz/60 Hz hum.

Table 2.5: COMP VIDEO Connector

Pin	Signal
Centre	Video Input
Screen	Video Input Return
Impedance	75 Ω

2.6.6 Audio Inputs



Connect the audio cable to the **AUDIO IN** connector. The 15-way, D-type male connector is used in different ways according to the audio input and the encoding configuration selected.

The connector provides two stereo pairs. They may be independently configured as either analogue or digital. The left channel is used to input digital audio.

The Encoder is supplied with a **break-out cable** which plugs into this connector, and provides a more convenient means of connecting the audio signals via five connectors. There are four XLR female connectors, with the fifth cable being a BNC which provides an AES/EBU 75 Ω digital reference output.

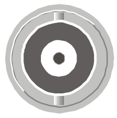
Table 2.6: Audio In Connector

Pin	Signal		Pin	Signal	
	Analogue	Digital		Analogue	Digital
1	Left Channel A (+)	AES/EBU (A) (+)	9	Left Channel A (-)	AES/EBU (A) (-)
2	Not connected		10	Right Channel A (+)	
3	Right Channel A (-)		11	Not connected	
4	Left Channel B (+)	AES/EBU (B) (+)	12	Left Channel B (-)	AES/EBU (B) (-)
5	Not connected		13	Right Channel B (+)	
6	Right Channel B (-)		14	Not connected	
7		AES/EBU Reference (Signal)	15		AES/EBU Reference (Ground)
8	Not connected				

NOTES...

1. In analogue mode termination is either 20 kΩ or 600 Ω.
2. In AES/EBU mode termination is 110 Ω.
3. When the Encoder is powered down the digital channel is selected with 110 Ω termination.
4. The digital audio input does not support SPDIF.
5. In order to comply with EMC regulations, use the audio break-out cable supplied with the unit.

2.6.7 ASI OUT 1, 2 and 3 Outputs



Connect the Multiplexer or Modulator ASI cable to the appropriate ASI OUT connector, using good quality 75 Ω coaxial cable (for example, BBC PSF 1/3).

A 75 Ω BNC connector provides the output from the Encoder.

Table 2.7: ASI OUT 1, 2 and 3 Connectors

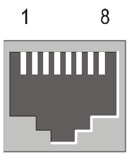
Pin	Signal
Centre	Signal
Screen	Ground

2.6.8 Control Interfaces

Connection

Operation of the Encoder from a TANDBERG Television control system is via the Ethernet network running the Simple Network Management Protocol (SNMP) protocol. Connect the **ETHERNET** connector to the controller (for example, MEM). Local control is implemented through the front panel keypad and display. See *Chapter 4, Operating the Equipment Locally* for details of how to access the front panel menus.

Ethernet #1 and #2

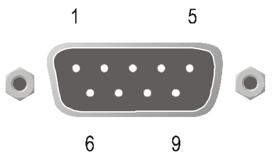


An 8-way, RJ-45 connector provides a 10BaseT Ethernet interface for communications with the MEM for control and monitoring. The Encoder has a single switched Ethernet channel. Ethernet#1 is selected as default at power-up. If a carrier is not detected on Ethernet#1 then the input switches to Ethernet#2. This gives a redundant Ethernet control via two hubs.

Table 2.8: Ethernet Connector

Pin	Signal	Pin	Signal
1	Tx Out (+)	4-5	Not connected
2	Tx Out (-)	6	Rx In (-)
3	Rx In (+)	7-8	Not connected

Alarm

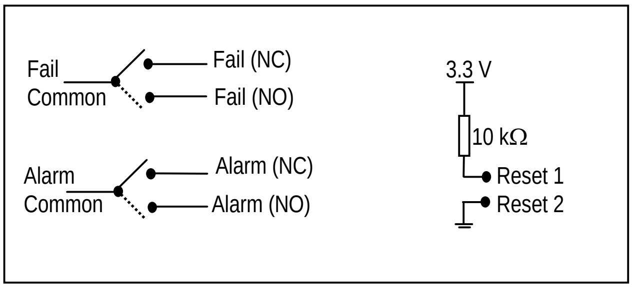


If required, connect an external status monitoring device to the **ALARM** connector.

A 9-way, D-type male connector provides an alarm relay interface which can be used to send a signal to remote equipment.

Table 2.9: Alarm Connector

Pin	Signal	Pin	Signal
1	Ground	6	Fail (NO)
2	Fail (common)	7	Fail (NC)
3	Alarm (NO)	8	Alarm (common)
4	Alarm (+) (NC)	9	Reset 2 (internally grounded)
5	Reset 1 (internally pulled to 3.3 V via 10 kΩ)		



NOTE...

NC = Normally Closed, NO = Normally Open, and refers to the relay contacts. Refer to *Annex B, Section B.4.3, Alarm* for details of the relay contact rating.

Remote Control

A 9-way, D-type male connector provides an RS-232/RS-485 port for remote control of the Encoder (see *Serial Protocol Option*). This connector is wired as a DTE.



Table 2.10: Remote Control Connector (RS-232/ RS-485)

Remote (DTE)		Encoder (DTE) Remote Control	
Signal Name	Signal Direction	Pin	Signal Name
		1	Not connected
Transmit Data	→	2	Received Data (RS-232)
Received Data	←	3	Transmit Data (RS-232)
		4	Not connected
Signal Ground	—	5	Signal Ground
Transmit Data B	→	6	Received Data B (RS-485)
Received Data A	←	7	Transmit Data A (RS-485)
Received Data B	←	8	Transmit Data B (RS-485)
Transmit Data A	→	9	Received Data A (RS-485)

NOTES...

1. Signal names are with respect to a DTE in accordance with the RS-232 and RS-485 specification. A is positive and B is negative.
2. A null modem connection must be used when connecting DTE together.

2.6.9 Data

RS-232 Connector

RS-232 data is available on the Base Board[2] and the option module M2/EOM2/DAT.

Table 2.11: RS-232 Data Connector (Base Board) - Asynchronous

Remote (DTE) Male			Encoder RS-232 (DTE) Female	
Signal Name	Pin	Signal Direction	Pin	Signal Name
	1		1	Not connected
Received Data	2	←	2	Received Data
Transmit Data	3	→	3	Transmit Data
	4		4	Not connected
Signal Ground	5	—	5	Signal Ground
	6		6	Not connected
	7		7	Not connected
	8		8	Not connected
	9		9	Not connected

[2] RS-232 data is not supported on the Base Board before Build version 2.0.

NOTES...

1. Signal names are with respect to a DTE in accordance with the RS-232 specification.
2. Remote pin numbers only apply to a 9-way D-type connector.
3. 25-way connectors have Received Data on pin 3 and Transmit Data on pin 2 (see RS –232 specification).
4. XON/OFF flow control may be used with this port.

RS-422 Connector

A 15-way, D-type female connector provides an RS-422 synchronous, serial communications data input interface.

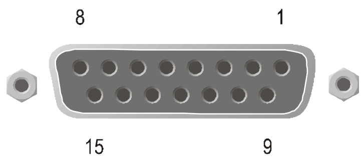


Table 2.12: RS-422 Data Connector (Base Board) - Synchronous

Remote (DTE)		Encoder RS-422 (DCE)	
Signal Name	Signal Direction	Pin	Signal Name
		1	Not connected
Transmit Data A	→	2	Transmit Data A
		3	Not connected
		4	Not connected
		5	Not connected
		6	Not connected
Transmit Clock A	→	7	Transmit Clock A
Signal Ground	—	8	Signal Ground
Transmit Data B	→	9	Transmit Data B
		10	Not connected
		11	Not connected
		12	Not connected
		13	Not connected
Transmit Clock B	→	14	Transmit Clock B
		15	Not connected

NOTE...

Signal names are with respect to a DTE in accordance with the RS-422 specification. A is positive and B is negative.

2.6.10 Satellite Modulator IF Output (E5714 and E5740 IF)

IF Out (Main)

75 Ω BNC socket provides an IF output.

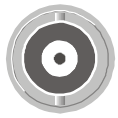


Table 2.13: IF Out Connector (Main)

Item		Specification
Connector type		BNC 75 Ω Female
Type		Analogue
Connector designation		IF OUT MAIN
Pin-outs	Centre Screen	IF Output Ground

IF Out (Monitor)

75 Ω BNC socket provides an IF output used for monitoring.

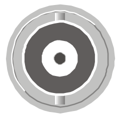


Table 2.14: IF Output Connector (Monitor)

Item		Specification
Connector type		BNC 75 Ω Female
Type		Analogue
Connector designations		IF OUT MONITOR
Pin-outs	Centre Screen	IF Output Ground

2.6.11 Satellite Modulator L-Band Output (E5740 LBAND)

L-Band In

50 Ω SMA female connector provides an L-band input to allow another L-band signal to be summed with the modulator output.

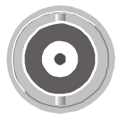


Table 2.15: L-band In Connector

Item		Specification
Connector Type		50 Ω SMA Female
Type		Analogue
Connector designation		L-Band In
Pin-outs	Centre	Signal
	Screen	Ground

L-Band Out (Main)

50 Ω SMA female connector provides the main L-band output. This can also provide +24 V dc at up to 500 mA to power an up-converter.

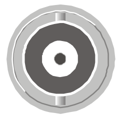


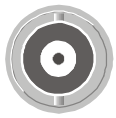
Table 2.16: L-band Out (Main) Connector

Item		Specification
Connector Type		50 Ω SMA Female
Type		Analogue
Connector designation		L-Band Out Main
Pin-outs	Centre	Signal
	Screen	Ground

> CAUTION...
> The modulator provides dc power to drive an up-converter. Do not connect equipment to the main output which might be damaged by dc power without protecting with a suitable dc block.

L-Band Out (Monitor)

75 Ω F-type female provides an L-band monitoring output which is –30 dB relative to the main output.



Item		Specification
Connector Type		75 Ω F-type Female
Type		Analogue
Connector designation		L-Band Out Monitor
Pin-outs	Centre	Signal
	Screen	Ground

Up-Converter Power

An LED is illuminated when the +24 V dc up-converter power on the main output is switched on.

2.6.12 OFDM Modulator Outputs (E5715 and E5750)

IF Out 1

A 75 Ω BNC socket provides a 70 MHz IF output.

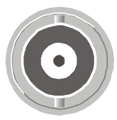


Table 2.17: IF Out 1 Connector

Item		Specification
Connector Type		BNC 75 Ω Female
Type		Analogue
Connector designation		IF Out 1
Pin-outs	Centre	Signal
	Screen	Ground

IF Out 2

A 75 Ω BNC socket provides a 70 MHz IF output used for monitoring.

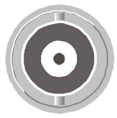


Table 2.18: IF Out 2 Connector

Item		Specification
Connector Type		BNC 75 Ω Female
Type		Analogue
Connector designation		IF Out 2
Pin-outs	Centre	Signal
	Screen	Ground

2.7 Powering Up / Down

2.7.1 Before Powering Up

Before powering up the Encoder, check that:

1. The unit has been installed in a suitable location.
2. The unit has been connected to external equipment and power supply, as required.
3. The power supply has been checked and a good earth provided.
4. The correct fuse type and rating has been fitted to the equipment and, for the ac supply version, the ac power cable.

2.7.2 Powering Up

To power up the Encoder:

1. Turn on the local power supply. The Encoder executes a series of power-up initialisation and self-test routines.
2. Confirm that the green Power LED is lit and that the red Alarm LED is unlit.
3. Ensure that the Stand-by switch is set to On (see *Chapter 1, Introduction, Figure 1.8*).

After the boot period the Encoder Input Monitor screen is displayed.

> NOTES...
> 1. The fans on the Encoder can be temperature controlled so may not be on if the ambient temperature is low. Refer to *Annex B, Technical Specification* for more information.
> 2. During initialisation invalid PIDs may appear momentarily in the transport stream.

2.7.3 Powering Down

To power down the Encoder remove the power supply connection at the rear of the unit.

2.8 Setting the Encoder IP Address

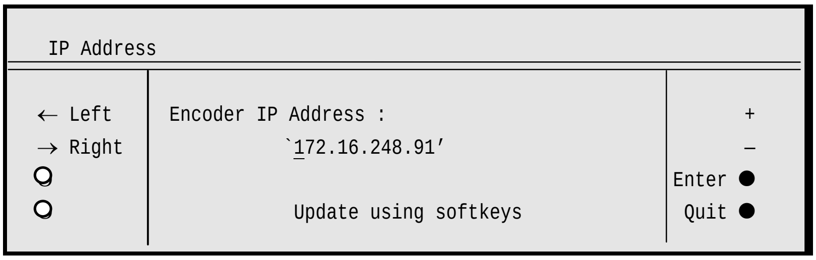
2.8.1 Methods of Changing the Encoder IP Address

If, for any reason, the IP address has to be changed, this can be achieved via the front panel menus (see *Section 4.7.4 Remote Control Menu*) or by Telnet (see *Section 2.8.3, Via Telnet*). The user may also set the network mask.

> NOTE...
> The new IP address is only accepted after the Encoder is repowered.

2.8.2 From the Front Panel Menus

To access the IP Address option from the front panel menus, press the **IP Address** softkey in the `Remote Control` Menu. Edit the IP address via the keypad and then press the **Enter** softkey.



2.8.3 Via Telnet

A Telnet program is supplied with Microsoft Windows. To communicate with the Encoder through Telnet:

1. From DOS, type **telnet <IP address>**.
2. Press **Enter** for the user name, and press **Enter** for the password.
3. The `Main Telnet` Menu is displayed.



Figure 2.9: Main Telnet Menu

4. Press **<a> System**, **<b> Remote Control**, **<a> IP Address**.
5. Enter the new value and press **Enter**.
6. Reset the Encoder.

Chapter 3

Options and Upgrades

Contents

List of Figures

List of Tables

3.1 What's Available

3.1.1 Option Functions

The basic Encoder functionality can be enhanced with the inclusion of options, hardware and software.

Each hardware option module consists of a horizontally mounted PCB with rear panel connector space (except the M2/EDCOM2/BISS which has no external connectors and does not occupy an option slot). At reset, the software of the Encoder detects which modules are fitted and configures them as necessary. The modules can be fitted into the positions indicated in *Table 3.1*.

When the appropriate software option has been purchased it is enabled in the Encoder, which resets and displays the appropriate menu items. See *Table 3.2* for the software options.

Table 3.1: Hardware Option Module Positions

Marketing Code	Name	Assembly Part No	Card Part No	Slot No. in 1U	Slot No. in 2U	Max No. of Cards in 2U
Daughter Card Options						
M2/EDCOM2/BISS	BISS[1] scrambling option - Mode 0, 1 and BISS-E only - with secure key entry	S12284	S11484	—	—	
Hardware Options						
M2/EOM2/AUDLIN	Additional Audio + Linear PCM	S12293	S11976	2	1, 4, 5	3
M2/EOM2/DAT	Data Card - for additional Data	S12369	S12368	2	1, 4, 5	3
M2/EOM2/REMUX (supported by Encoder software version 2.2 and later)	Remux Option Module	S12449	S10655	2	1	1
M2/EOM2/XLR	XLR Expander Card	S12556	S12557	Not available	1 and 4 (uses double slot)	1
M2/EOM2/DEC	SD Decoder Card	S11753	S11385	-	6	1
M2/EOM2/QPSK DEMOD	QPSK Demod Card	S11852	-	-	5	1
M2/EOM2/SAT DEMOD	16QAM Demod Card	S12640	-	-	5	1
M2/EOM2/IP	IP Output Card	S12794	S12822	1	3, 5, 6	1

NOTE...

Empty option slots must be fitted with a blanking plate.

[1] BISS is implemented according to Tech 3290 March 2000 and BISS-E is implemented according to Tech 3292 April 2001. BISS-E is available from Build version 2.2.0 and later.

Table 3.2: Software Options

Marketing Code	Name	Used in 1U	Used in 2U
M2/ESO2/NR	Noise Reduction	✓	✓
M2/ESO2/PU	Performance Upgrade/Bit-rate <1.5 Mbit/s	✓	✓
M2/ESO2/VBR	VBR Licence	✓	✓
M2/ESO2/422	4:2:2	✓	✓
M2/ESO2/RAS	RAS (Remote Authorisation System)	✓	✓
M2/ESO2/ACON	Auto Concatenation	✓	✓
M2/ESO2/AC3	Dolby Digital (AC-3)	✓	✓
M2/ESO2/SM38PSK	8PSK Modulation	—	✓
M2/ESO2/SM316QAM	16QAM Modulation	—	✓
M2/ESO2/8PSKDEMOD	8PSK Demodulation (only applicable if M2/EOM2/SAT DEMOD is fitted)	—	✓
M2/ESO2/16QAM DEMOD	16QAM Demodulation (only applicable if M2/EOM2/SATDEMOD is fitted)	—	✓
M2/ESO2/LSYM	Low Symbol Rate operation (minimum reduced to 300 ksym/s)	—	✓

3.1.2 Limitations on Number of Option Modules (2U Only)

Overview

If the Remux option is not fitted then there can be a maximum of three option modules (any combination of additional audio and data).

If the Remux option module is fitted there can be a maximum of two other option modules (any combination of additional audio and data).

E5740 Option Slots

Base Board		
Option Slot 4	Option Slot 5	Option Slot 6
Option Slot 1	Satellite Modulator	

E5750 Option Slots

Base Board		
Option Slot 4	Option Slot 5	OFDM Modulator
Option Slot 1	Option Slot 2	Option Slot 3

3.1.3 Limitations on Use of Option Modules

Although both BISS (M2/EDCOM2/BISS) and RAS (M2/ESO2/RAS) may be present in the Encoder, only one may be used at a time.

3.1.4 How to See Which Options are Fitted/Enabled

The Encoder has a number of hardware and software options (see *Table 3.1* and *Table 3.2*). To see which are fitted/enabled refer to the `Build Menu` (see *Chapter 4, Operating the Equipment Locally*, *Figure 4.9*).

3.2 Bit-rate Limits With Reflex Licence and/or Performance Upgrade

A user with a REFLEX licence (M2/ESO2/VBR) but no Performance Upgrade (M2/ESO2/PU) will be able to get lower bit-rates than 1.5 Mbit/s. This only occurs in Seamless modes. However, because the Performance Upgrade has not been bought the picture quality will be reduced (see *Table 3.3*).

Table 3.3: Minimum Bit-rates With and Without Performance Upgrade

Performance Upgrade	Reflex Licence	B_{min} Non-seamless Modes	B_{min} Seamless Modes (Front Panel, SNMP)	B_{min} Seamless Modes (Reflex, MEM)
×	×	1.5 Mbit/s	1.5 Mbit/s[2]	Not Possible
×	✓	1.5 Mbit/s	1.5 Mbit/s[2]	Depends on Coding Mode
✓	×	0.256 Mbit/s	Depends on Coding Mode	Not Possible
✓	✓	0.256 Mbit/s	Depends on Coding Mode	Depends on Coding Mode

NOTE...

B_{min} is the minimum bit-rate that can be set.

3.3 Basic Interoperable Scrambling System - BISS (M2/EDCOM2/BISS)

With the appropriate configuration, the Encoder can use the Basic Interoperable Scrambling System (BISS[3]) to scramble the outgoing transport stream. This system has been developed by the European Broadcasting Union (EBU) as an open scrambling system.

BISS has three main levels of operation: Mode 1, Mode 2 and Mode 3. Mode 0 corresponds to no scrambling. BISS-E is also available in Build version 2.2.0 and later.

NOTE...

Only Modes 0 and 1 are available at Build version 2.1.0. Modes 2 and 3 are not supported.

BISS Mode 1 operation uses a fixed value for the control word to scramble the services in the transport stream from the Encoder. To descramble the transmission, the Decoder needs to have the matching control word value.

The BISS Module (M2/EDCOM2/BISS) comprises Assembly S12284 and Card S11484.

NOTES...

1. This option module is installed as a daughter card to the Base Board, with no external connectors and does not use an option slot.
2. The BISS software must also be enabled in the Encoder (see Customer Services).

[2] 1.5 Mbit/s, but possibly higher if limited by Coding Mode.
[3] BISS is implemented according to EBU Tech 3292 May 2002. BISS-E is available from Build version 2.2.0 and later.

BISS scrambling (when fitted) is enabled and controlled via the `Setup/Mux Menu` (see *Chapter 4, Operating the Equipment Locally, Section 4.12.12*).

3.4 Additional Audio and Linear PCM Option (M2/EOM2/AUDLIN)

3.4.1 Overview

The Additional Audio option module supplements the audio encoding functionality of the Encoder. This module supports audio standards MPEG-1 (layer 2), Dolby Digital (AC-3), Linear PCM, Dolby Digital (AC-3) Pass-through and Dolby E Pass-through. The module can take in audio as either stereo analogue or digital AES/EBU (on left channel only) via a 15-way D-type connector provided on its rear panel.

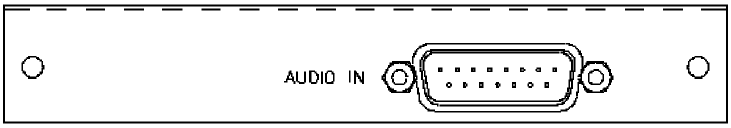
Alternatively, any two of the four pairs of embedded AES/EBU channels extracted from the video can be routed to the module for encoding. This option supports all the standard bit-rates and encoding modes associated with each compression standard.

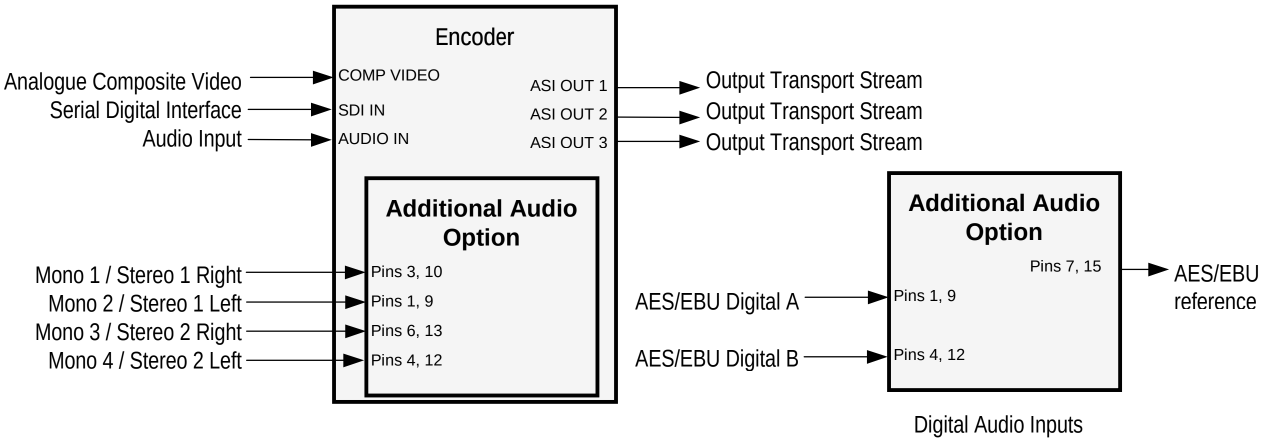
The `Audio Menu` associated with this option is described in *Chapter 4, Operating the Equipment Locally, Section 4.9*. In the `Audio Setup Menu` additional options are displayed for Audio XA and Audio XB, where X is the option slot number where the module is fitted.

Refer to *Annex G, Audio Modes* for details of Encoder locking to ensure correct performance.

3.4.2 Assembly

Rear Panel



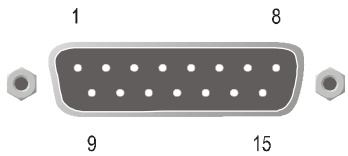


> NOTE...
>
> The AES/EBU reference signal is provided for backwards compatibility only. When using E57xx Encoders use the reference signal provided by the Base Board.

Figure 3.1: Additional Audio and Linear PCM Option (M2/EOM2/AUDLIN)

The Additional Audio option module comprises Assembly S12293 and Card S11976. See *Table 3.1* for the slots that it can be installed in.

Audio In Connector



Connect the audio cable to the **AUDIO IN** connector. The 15-way, D-type male connector is used in different ways according to the audio input and the encoding configuration selected.

The connector provides two stereo pairs. They may be independently configured as either analogue or digital. The left channel is used to input digital audio.

Table 3.4: Audio In Connector

Pin	Signal		Pin	Signal	
	Analogue	Digital		Analogue	Digital
1	Left Channel A (+)	AES/EBU (A) (+)	9	Left Channel A (-)	AES/EBU (A) (-)
2	Not connected		10	Right Channel A (+)	
3	Right Channel A (-)		11	Not connected	
4	Left Channel B (+)	AES/EBU (B) (+)	12	Left Channel B (-)	AES/EBU (B) (-)
5	Not connected		13	Right Channel B (+)	
6	Right Channel B (-)		14	Not connected	
7		AES/EBU Reference (Output Signal)	15		AES/EBU Reference (Ground)
8	Not connected				

NOTES...

1. In analogue mode termination is either 20 kΩ or 600 Ω.
2. In AES/EBU mode termination is 110 Ω (default).
3. When the Encoder is powered down the digital channel is selected with 110 Ω termination.
4. The digital audio input does not support SPDIF.

CAUTION...

To ensure EMC compliance, use the audio connector supplied with the Encoder.

3.5 RS-232 and RS-422 Data Input Option (M2/EOM2/DAT)

3.5.1 Overview

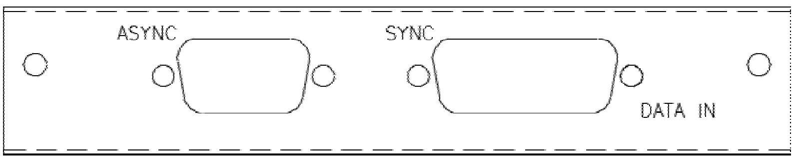
> NOTE...
> The Data Input Option does not report errors back to the host, thus no alarms are raised by the Encoder.

The RS-232 and RS-422 Data Input option module comes with an RS-422 synchronous data input and an RS-232 asynchronous data input. These inputs have been designed for backward compatibility to existing System 3000 Encoders. RS-232 data is input on a dedicated 9-way D-type connector and RS-422 data is input on a dedicated 15-way D-type connector.

RS-422 supports n x 64 kbit/s (up to 2.048 Mbit/s) or n x 56 kbit/s (up to 1.792 Mbit/s) data rates where n = up to 32 maximum. The RS-232 input can support data baud rates of 1.2 kbaud - 19.2 kbaud.

3.5.2 Assembly

Rear Panel



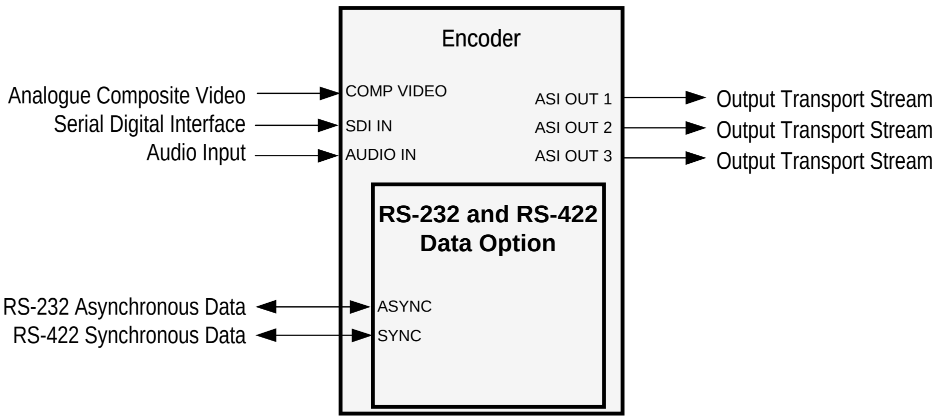


Figure 3.2: RS-232 and RS-422 Data Input Option M2/EOM2/DAT

The RS-232 and RS-422 Data Input option module comprises Assembly S12369 and Card S12368. See *Table 3.1* for the slots that it can be installed in.

Async Connector

A 9-way, D-type female connector provides an RS-232 asynchronous, serial communications data input interface.

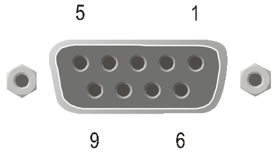


Table 3.5: RS-232 Data Connector (Option Module) - Asynchronous

Remote (DTE) Male			Data Module RS-232 (DCE) Female	
Signal Name	**Pin**	**Signal Direction**	**Pin**	**Signal Name**
Data Carrier Detected	1	←	1	Data Carrier Detected
Received Data	2	←	2	Received Data
Transmit Data	3	→	3	Transmit Data
	4		4	Not connected
Signal Ground	5	—	5	Signal Ground
Data Set Ready (DSR)	6	←	6	Data Set Ready (DSR)
	7		7	Not connected
Clear to Send (CTS)	8	←	8	Clear to Send (CTS)
	9		9	Not connected

NOTES...

1. Signal names are with respect to a DTE in accordance with the RS-232 specification.
2. Remote pin numbers only apply to a 9-way D-type connector.
3. 25-way connectors have Received Data on pin 3 and Transmit Data on pin 2 (see RS –232 specification).
4. XON/OFF flow control may be used with this port.

Sync Connector

A 15-way, D-type female connector provides an RS-422 synchronous, serial communications data input interface.

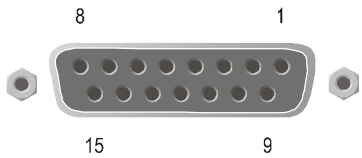


Table 3.6: RS-422 Data Connector (Option Module) - Synchronous

Remote (DTE)		Data Module RS-422 (DCE)	
Signal Name	Signal Direction	Pin	Signal Name
		1	Not connected
Transmit Data A	→	2	Transmit Data A
Data Terminal Ready A	→	3	Data Terminal Ready A
Received Data A	←	4	Received Data A
Data Set Ready A	←	5	Data Set Ready A
Received Clock A	←	6	Received Clock A
Transmit Clock A	→	7	Transmit Clock A
Signal Ground	—	8	Signal Ground
Transmit Data B	→	9	Transmit Data B
Data Terminal Ready B	→	10	Data Terminal Ready B
Received Data B	←	11	Received Data B
Data Set Ready B	←	12	Data Set Ready B
Received Clock B	←	13	Received Clock B
Transmit Clock B	→	14	Transmit Clock B
		15	Not connected

NOTE...

Signal names are with respect to a DTE in accordance with the RS-422 specification. A is positive and B is negative.

3.6 Remux Option (M2/EOM2/REMUX)

3.6.1 Overview

NOTE...

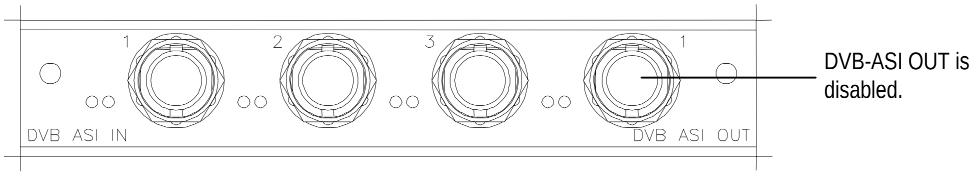
The M2/EOM2/REMUX Remux Option Module is supported by Build version 2.2.0 and later.

The Remux option module is capable of accepting up to three separate transport streams via ASI connectors, and one transport stream from the host Encoder. The maximum permissible data rate of each input transport stream is 50 Mbit/s. Some or all of the services in the input transport streams are then multiplexed together to produce a Multiple Channels Per Carrier (MCPC) output at up to 50 Mbit/s. For a specification of this interface see *Annex B, Technical Specification*

3.6.2 Assembly

Rear Panel

The Remux option module comprises assembly S12449 and Card S10655. See *Table 3.1* for the slots that it can be installed in.



CAUTION...

When remultiplexing, be aware that both PIDs and Service Names will be remapped according to the Host Encoder input used.

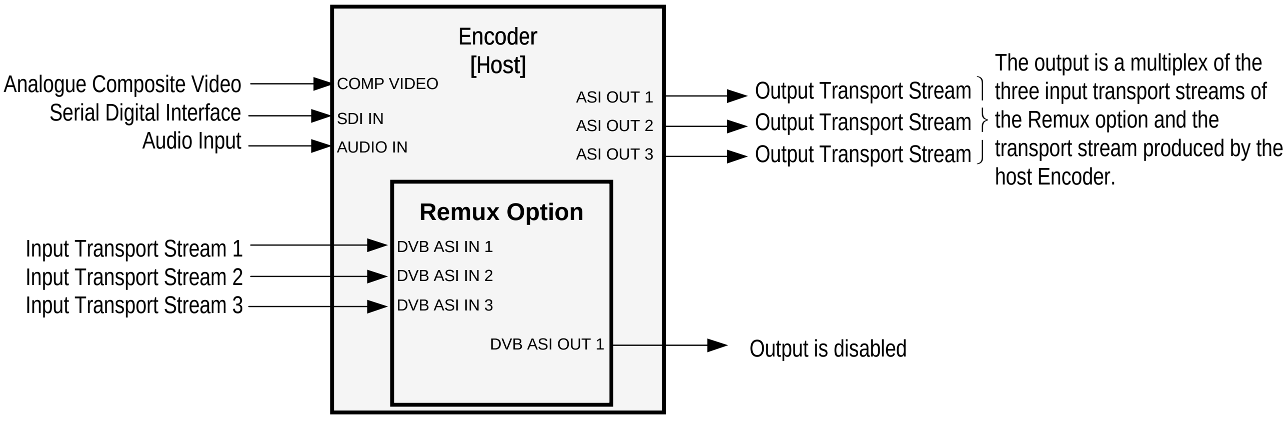
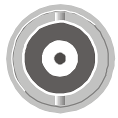


Figure 3.3: Remux Option (M2/EOM2/REMUX)

DVB ASI IN 1, 2 and 3 Connectors



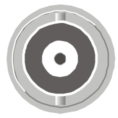
A 75 Ω BNC connector provides an input to the unit.

Table 3.7: DVB ASI In Connector

Pin	Signal
Centre	Signal
Screen	Ground

> NOTE...
> When connecting the inputs, always start from DVB ASI IN 1 and work upwards.

DVB ASI OUT 1 Connector



A 75 Ω BNC connector provides an output from the unit.

Table 3.8: DVB ASI Out Connector

Pin	Signal
Centre	Signal
Screen	Ground

> NOTE...
> This output is disabled.

3.6.3 Stages of Remultiplexing

The Remultiplexer is capable of combining four inputs. Three inputs are in the form of ASI feeds to the rear panel, the fourth input is fed from the host Encoder (or primary Encoder). This basic configuration, using a single stage of remultiplexing, means that four Encoder services (or streams) can be combined together in the output. *Figure 3.4* shows a typical satellite system using one stage of remultiplexing.

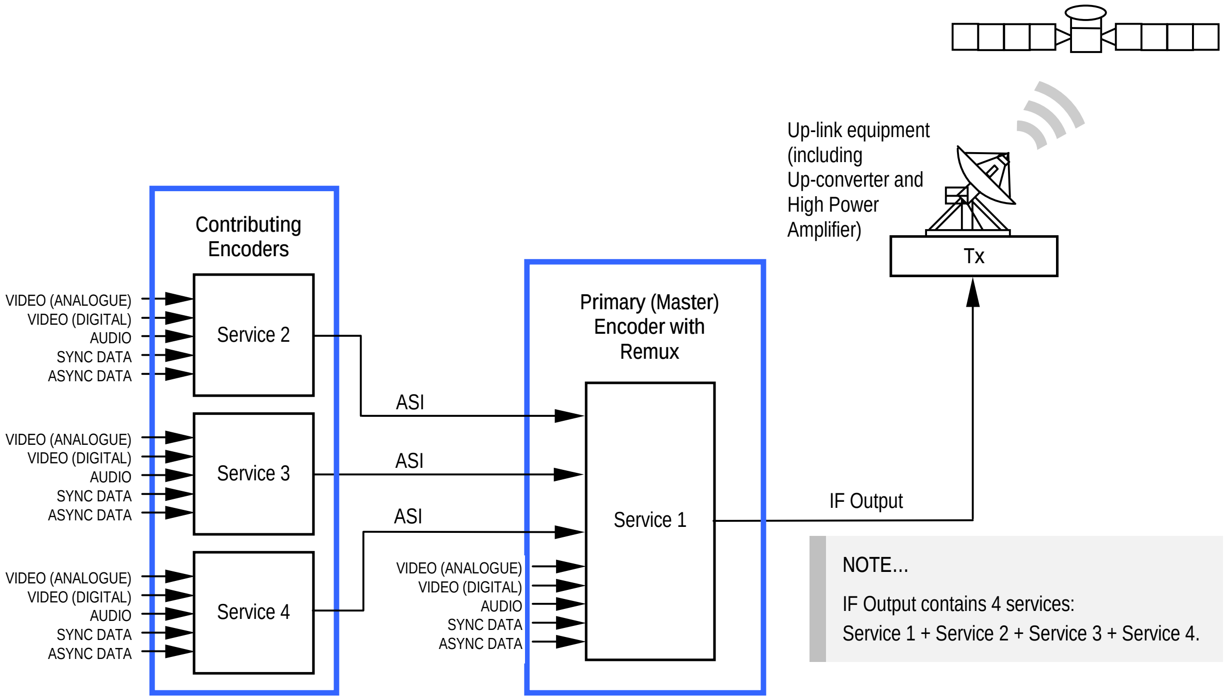


Figure 3.4: Block Diagram – One Stage of Remultiplexing

Similarly, if two stages of remultiplexing are introduced, thirteen Encoders can be combined, providing up to thirteen services in the remultiplexed output. This is the maximum number of services that can be provided using this system, see *Figure 3.5*.

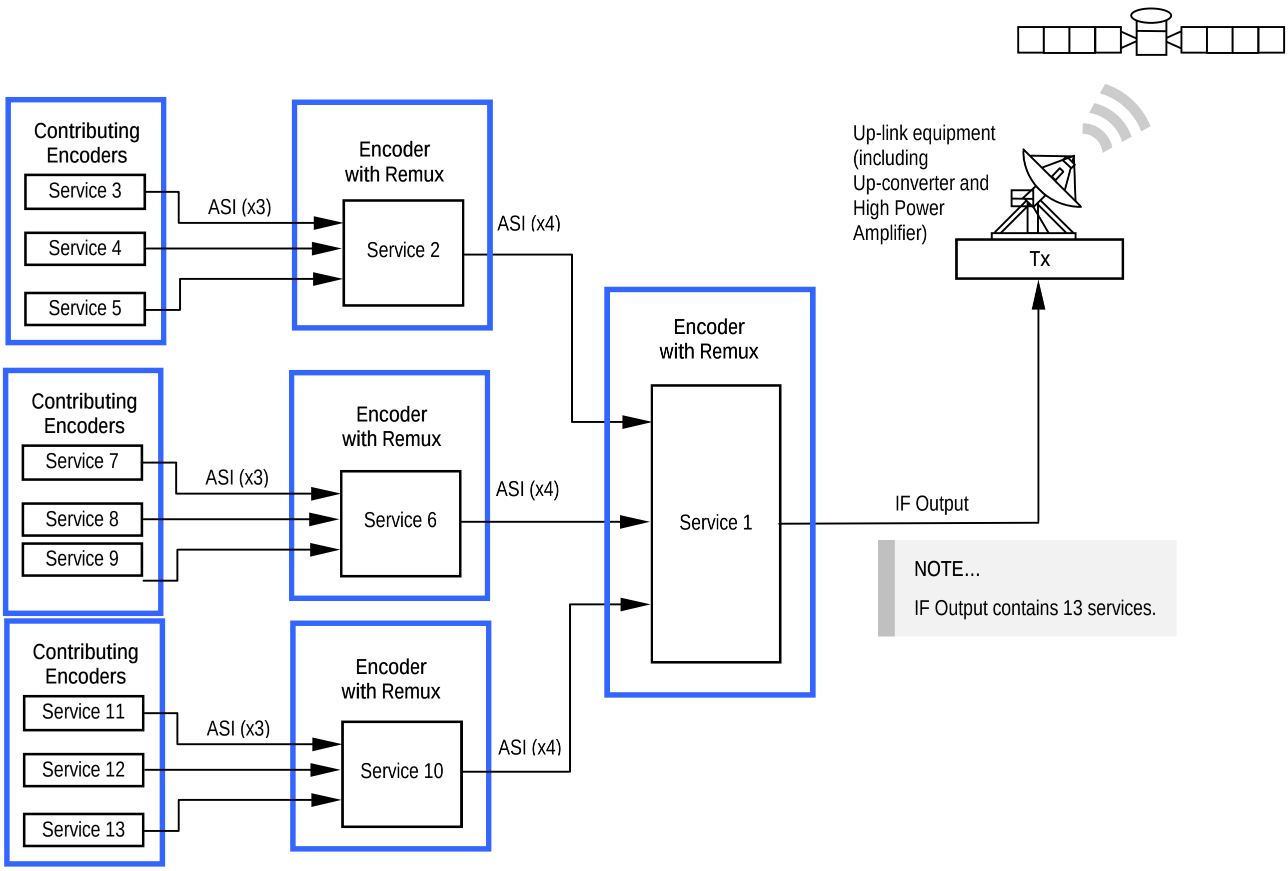


Figure 3.5: Block Diagram – Two Stages of Remultiplexing

3.6.4 Function of Remultiplexer

It is the function of the Remultiplexer to combine the locally generated host services with the externally supplied input services, connected via ASI inputs to the rear of the unit. If the Service ID (DVB) or Program Number (ATSC), PIDs or service names, of two or more of the services clash, the Remultiplexer can remap the Service ID or program number, remap PIDs, and alter the service names to resolve the clash.

If a new service is detected on any input, and it clashes with an existing service, it is the new service's Service ID or Program Number, PIDs, or Service Name that are remapped to resolve the conflict. Service names are made unique by the addition of a number, for example 'Default Service' may be renamed 'Default Service [2]'.

The way the Remultiplexer deals with user requests to remap PIDs depends on its mode of operation.

When set to 'Intelligent Mode' (see *Remux Mode Option*), if the user then attempts to move/remap a PID to a PID already being used, the Remultiplexer allows this to happen, and automatically remaps the element that was on that PID.

When the Remultiplexer is operating in 'Dumb Mode', if the user tries to remap an element onto a PID that is already being used, it will not allow the change to take place.

> NOTE...
> When operating in 'Dumb Mode' the Encoder may power up with unresolved PID clashes, which the user must resolve.

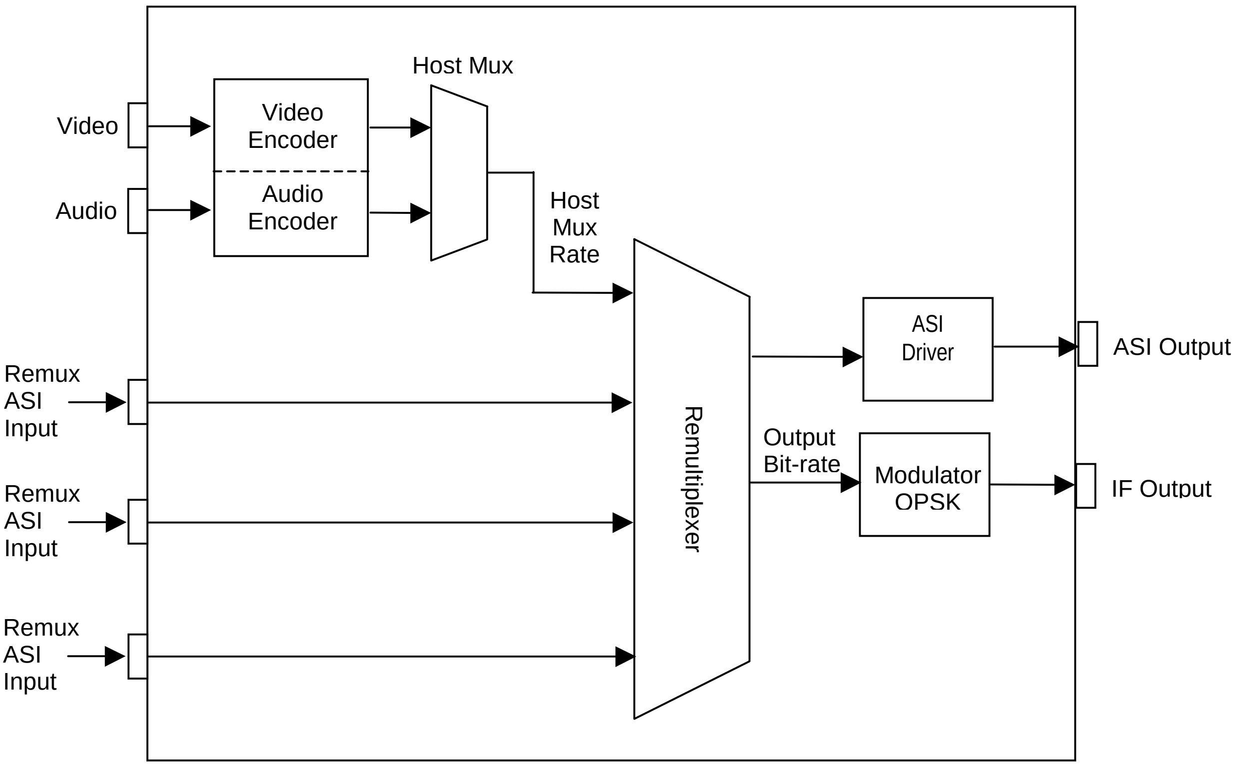


Figure 3.6: Remultiplexer Block Diagram

3.6.5 Using the Remultiplexer

Set the output bit-rate to the required value in the `Setup/Mux Menu`.

Connect transport streams that are to be combined (remultiplexed) with the host Encoder’s services to the ASI inputs on the rear of the unit.

> NOTE...
>
> It is possible to remultiplex any DVB or ATSC compliant transport stream but at the time of publication, only transport streams generated by TANDBERG Television equipment are guaranteed to work when fed to the Remultiplexing module.

The equipment will automatically detect the services on these inputs. The list of detected services is displayed in the `Setup/Mux Menu`.

Each service can be individually switched ‘Off’, ‘On’, or ‘On with scrambling’. If the service is set to ‘Off’, then there is no trace of the service in the output transport stream. Each new service defaults to ‘Off’, unless it was connected to the Remultiplexer the last time the Encoder was powered, when it assumes its previous state.

It is possible to remultiplex transport streams that have already been scrambled by BISS encryption, but it is not possible to remultiplex transport streams that have already been scrambled using RAS encryption. Also it is not possible to scramble a service that has already been scrambled.

3.6.6 ATSC Remultiplexing

The Remultiplexer can work with ATSC compliant transport streams. It remaps the services following the ATSC program paradigm.

The Encoder can be configured to generate the PSIP for the output transport stream. It generates the minimum number of tables to give an ATSC compliant output transport stream, i.e. Event Information Tables (EIT) 0, 1, 2 and 3, the System Time Table (STT), the Rating Region Table (RRT), the Master Guide Table (MGT), and either the Cable Virtual Channel Table (CVCT) or the Terrestrial Virtual Channel Table (TVCT), depending on the delivery descriptor set. It will not pass through any tables that are present on the ASI input transport streams.

Alternatively, an external PSIP generator can be connected to one of the Remultiplexer inputs and the remultiplexer programmed to pass through a range of PIDs, thus inserting the PSIP into the output transport stream.

For more information about using the Remux card in ATSC with internal and external PSIP *see Annex J, Use of Remux Card in ATSC*.

3.6.7 Setting Bit-rates and Avoiding Overflow

Overflow is the condition in which the total of the contributing service bit-rates, (including the host mux), exceeds the output bit-rate of the primary remultiplexing unit.

> NOTE...
>
> Only useful packets (e.g. video, audio and data, etc) count towards the bit-rate of the contributing service bit-rates, not null packets.

The easiest way to configure the bit-rates to avoid overflow, is as follows:

1. Divide the 188 byte output bit-rate of the primary (master) remultiplexing unit, (this can be found in the `Setup/Mux/Remux Module/Output Bit-rate`), by the number of contributing services (including the primary service). Such that:

   O/P Rate (188) / N = Host Rate (188)

   [Where N = number of services to be combined including primary]

2. Then set the Host Rates (188) of each contributing unit and the master unit to equal the calculated Host Rate.

If the above procedure is followed, an equal bit-rate is allocated to each contributing unit. By setting the host rates, the video and audio bit-rates will be automatically adjusted to suit.

The amount of spare bit-rate and input bit-rate that has been used in the Remultiplexer can be monitored using the bar graph indicators in the `Setup/Mux/Remux Module` Menu.

3.6.8 What to do if Overflow Occurs

If an ‘Overflow Error’ is indicated on the equipment, then the incoming contributing bit-rate exceeds the outgoing bit-rate. To avoid corruption reduce the incoming bit-rate by either removing services, (turn the service ‘Off’ or remove the ASI input), or reduce the bit-rate of the incoming service.

3.7 XLR Expander Card Option (M2/EOM2/XLR)

3.7.1 Overview

> NOTE...
> The M2/EOM2/XLR XLR Expander Card Option is supported by Build version 3.0 and later.

The XLR Expander Card Option permits Encoders to input and output a stereo audio pair via XLR connectors. The option occupies two vertical option slots, 1 and 4, due to the size of the XLRs. Because of this it is available on the 2U version only.

The Audio menu associated with this option is described in *Chapter 4, Operating the Equipment Locally*.

3.7.2 Audio Inputs Receiver

The input accepts both analogue and digital AES/EBU (left channel only). When the unit is powered down the inputs default to digital. The input impedance of the digital channel is 110 Ω, while the analogue input operates at either 600 Ω or 20 kΩ.

The analogue receiver works at clip levels of 18 dB or 15 dB. Analogue inputs are sampled at 48 kHz. The signal from the audio receiving inputs is routed to the backplane as a single AES/EBU formatted digital signal.

3.7.3 Audio Outputs Transmitter

The XLR outputs deliver both analogue or digital AES/EBU (left channel only). When delivering digital audio the output impedance is 110 Ω. The analogue output is low impedance. The analogue transmitter works at 15 dB or 18 dB FSR.

The audio transmitter may select its source from any of the following:

- Four AES/EBU de-embedded feeds from the SDI feed
- Two of the AES/EBU feeds from the decoder
- Loop back
- Off

The analogue signal is reconstructed, based on the sampling rate of the AES/EBU signal source.

3.7.4 Assembly

Rear Panel



> NOTES...
> 1. Pre-encoded signals cannot be reconstructed on the analogue outputs.
> 2. Pre-encoded signals will raise an alarm on the digital output.

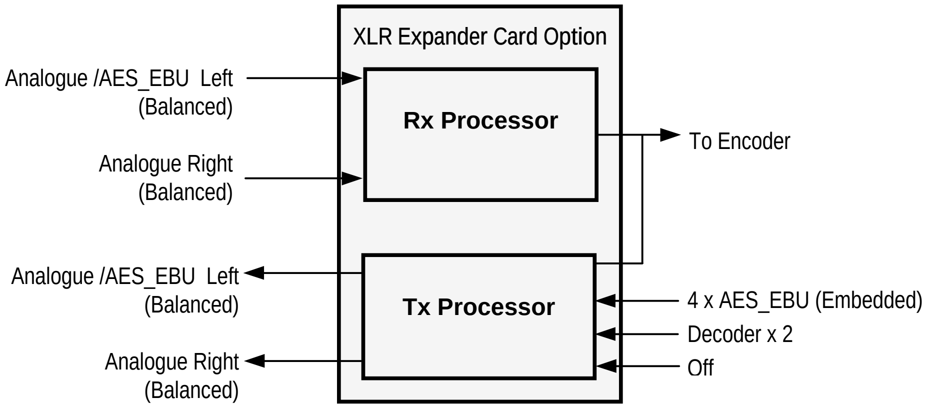


Figure 3.7: XLR Expander Card Option (M2/EOM2/XLR)

The XLR Expander Card option comprises Assembly S12556 and Card S12557. See *Table 3.1* for the slots that it can be installed in.

Audio In Connector

Two XLR female connectors provide a stereo pair. Each connector carries a single channel of an analogue stereo pair.
Digital audio is carried on the left connector.

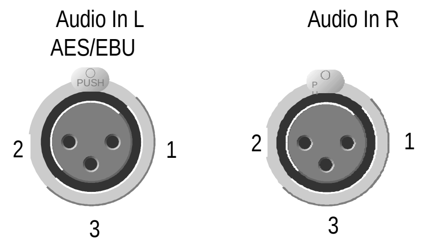


Table 3.9: Audio In L AES/EBU Connector

XLR IN L, AES/EBU		
Pin	Analogue	Digital
1	Screen	Screen
2	Channel (+)	AES/EBU (+)
3	Channel (-)	AES/EBU (-)
Nominal input impedance	600 Ω or 20 kΩ	110 Ω

Table 3.10: Audio In R Connector

XLR IN R		
Pin	Analogue	Digital
1	Screen	Not available
2	Channel (+)	
3	Channel (-)	
Nominal input impedance	600 Ω or 20 kΩ	

NOTES...

1. When the Encoder is powered down the digital channel is selected with 110 Ω termination.
2. The digital audio input does not support SPDIF.

Audio Out Connector

Two XLR male connectors provide a stereo pair. Each connector carries a single channel of an analogue stereo pair.
Digital audio is carried on the left connector.

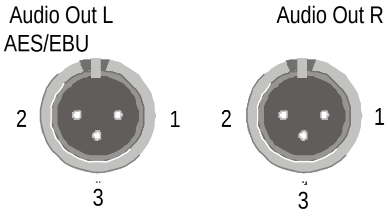


Table 3.11: Audio Out L AES/EBU Connector

XLR OUT L, AES/EBU		
Pin	Analogue	Digital
1	Screen	Screen
2	Channel (+)	AES/EBU (+)
3	Channel (-)	AES/EBU (-)
Nominal output impedance	10 Ω	110 Ω

Table 3.12: Audio Out R Connector

<table>
<tr><th colspan="3">XLR OUT R</th></tr>
<tr><th>Pin</th><th>Analogue</th><th>Digital</th></tr>
<tr><td>1</td><td>Screen</td><td rowspan="3">Not available</td></tr>
<tr><td>2</td><td>Channel (+)</td></tr>
<tr><td>3</td><td>Channel (-)</td></tr>
<tr><td>Nominal output impedance</td><td>10 Ω</td><td></td></tr>
</table>

CAUTION...

For maximum performance always use double-screened audio cables such as Canford Audio DFT cable.

3.8 SD Decoder Option (M2 / EOM2 / DEC)

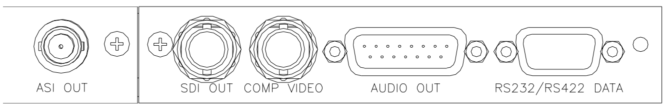
3.8.1 Overview

> NOTES...
> 1. The M2/EOM2/DEC SD Decoder Option is supported by Build version 3.1 and later.
> 2. This option module only fits into option slot 6 in the E5740, and must always be accompanied by a demodulator option module in slot 5.

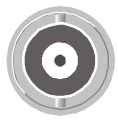
This option module is a complete MPEG-2 standard definition decoder, capable of decoding 422P@ML and MP@ML. It can provide analogue or digital video and audio outputs, as well as synchronous and asynchronous data outputs. In conjunction with a demodulator option module, it provides a complete satellite monitoring receiver within the E5740 Encoder.

3.8.2 Assembly

Rear Panel



ASI Out

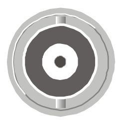


A 75 Ω female BNC connector provides an ASI output of the transport stream being decoded by the SD Decoder.

Table 3.13: ASI Out Connector

Item		Specification
Connector Type		75 Ω BNC Female
Connector designation		ASI Out
Pin-outs	Centre	Signal
	Screen	Ground

SDI Video Out



A 75 Ω female BNC connector provides an SDI video output that conforms to ITU-R BT.656.

Table 3.14: SDI Video Out Connector

Item		Specification
Connector Type		75 Ω BNC Female
Connector designation		SDI Out
Pin-outs	Centre	Signal
	Screen	Ground

Composite Video Output

A 75 Ω female BNC connector provides a composite video output. See *Annex B, Technical Specification* for a list of supported video standards.

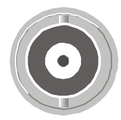


Table 3.15: Composite Video Connector

Item		Specification
Connector Type		75 Ω BNC Female
Connector designation		COMP VIDEO
Pin-outs	Centre	Signal
	Screen	Ground

Audio Output

A 15-way D-type socket provides the audio output.

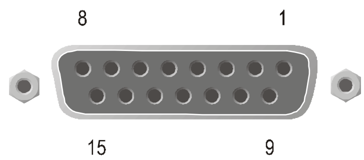
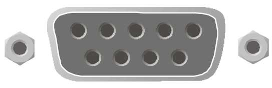


Table 3.16: Audio Output Connector

Item		Specification
Connector Type		15-way D-type Socket
Connector designation		AUDIO OUT
Pin-outs	1	Ch 1 Left Analogue+/Ch 1 Digital+
	2	Analogue Ground
	3	Ch 1 Right Analogue -
	4	Ch 2 Left Analogue+/Ch 2 Digital+
	5	Analogue Ground
	6	Ch 2 Right Analogue -
	7	Reserved
	8	Analogue Ground
	9	Ch 1 Left Analogue-/Ch 1 Digital-
	10	Ch 1 Right Analogue +
	11	Analogue Ground
	12	Ch 2 Left Analogue-/Ch 2 Digital-
	13	Ch 2 Right Analogue +
	14	Analogue Ground
	15	Reserved

RS-232/RS-422 Data Output



A 9-way D-type socket provides the data outputs.

Table 3.17: RS232/RS422 Data Output Connector

Item		Specification
Connector Type		9-way D-type Socket
Connector designation		RS232/RS422 DATA
Pin-outs	1	RS422_CLK_A
	2	RS232_RXD
	3	RS232_TXD
	4	No Connection
	5	Ground
	6	RS422_CLK_B
	7	No Connection
	8	RS422_DATA_A
	9	RS422_DATA_B

3.9 QPSK Demodulator (M2/EOM2/QPSKDEMOD)

3.9.1 Overview

> NOTE...
> The M2/EOM2/QPSKDEMOD QPSK Demodulator Option is supported by Build version 3.1 and later.

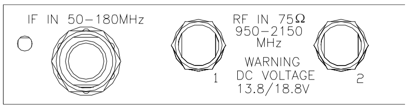
The module allows the Encoder to receive and demodulate satellite transmissions that comply to EN 300 421 (DVB-S). It must be used with an SD Decoder Module (M2/EOM2/DEC), which takes and decodes the transport stream produced by the demodulator.

The module has three inputs; an IF input that operates over a frequency range of 50 MHz to 180 MHz, and –20 dBm to –40 dBm input power, and two L-Band inputs that operate over a frequency range of 950 MHz to 2150 MHz, and –25 dBm to –65 dBm input power.

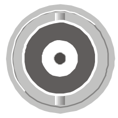
It can normally receive signals with symbol rates in the range 1 to 45 Msymbol/s, but if the low symbol rate option (M2/EOS2/LSYM) is purchased this can be expanded to cover 0.3 to 45 Msymbol/s.

3.9.2 Assembly

Rear Panel



IF In

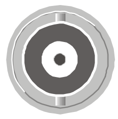


A 75 Ω female BNC connector provides an IF Input.

Table 3.18: IF In Connector

Item		Specification
Connector Type		75 Ω BNC Female
Connector designation		IF IN
Pin-outs	Centre	Signal
	Screen	Ground

RF In



Two 75 Ω F-type female connectors provide RF inputs.

Table 3.19 RF In Connector

Item		Specification
Connector Type		75 Ω F-type Female
Connector designation		RF 1, RF 2
Pin-outs	Centre	Signal
	Screen	Ground

3.10 16QAM Demodulator (M2/EOM2/SATDEMOD)

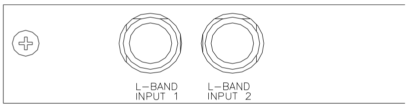
3.10.1 Overview

The module allows the Encoder to receive and demodulate satellite transmissions that comply to EN 300 421 (DVB-S), and EN 301 210 (DVB-DSNG). It must be used with an SD Decoder Module (M2/EOM2/DEC), which takes and decodes the transport stream produced by the demodulator.

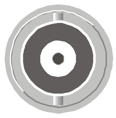
The module has two L-band inputs that operate over a frequency range of 950 MHz to 2150 MHz, and –25 dBm to –65 dBm input power. It can decode signals with symbol rates in the range 1 to 45 Msymbol/s. It is capable of demodulating 8PSK, and 16QAM transmissions, as well as QPSK transmissions, but these are software options.

3.10.2 Assembly

Rear Panel



L-Band Inputs



Two 75 Ω F-type female connectors provide L-band inputs.

Table 3.20: L-Band Input Connector

Item		Specification
Connector Type		75 Ω F-type Female
Connector designation		L-Band Input 1, L-Band Input 2
Pin-outs	Centre	Signal
	Screen	Ground

3.11 IP Output Card (M2/EOM2/IP)

3.11.1 Overview

The IP Output card provides a 10/100 BaseT Ethernet port, out of which the transport stream generated by the Encoder can be output in UDP packets at up to 50 Mbit/s.

The mapping of MPEG-2 transport stream packets into IP data frames is done according to the protocol stack shown in *Figure 3.8*.

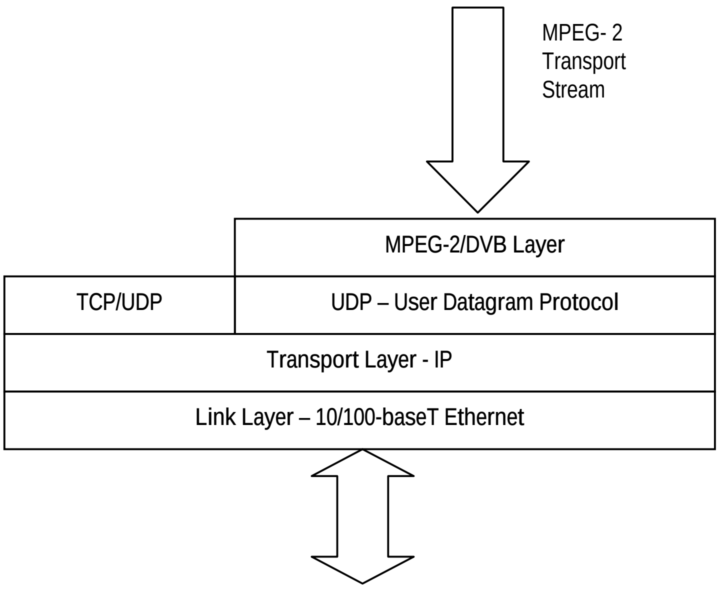
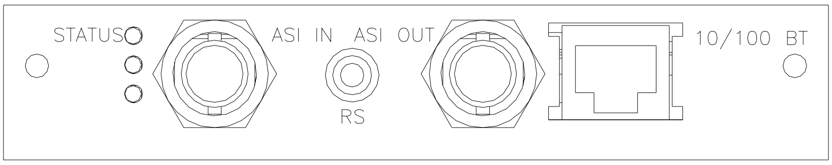


Figure 3.8: IP Output Protocol Stack

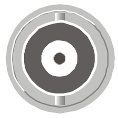
Between one and seven MPEG-2 transport stream packets can be put in each UDP packet. The data link layer is Ethernet according to IEEE 802.3/802.3u (auto-sensing 10/100 Mbit/s, twisted pair, via RJ-45 connector).

3.11.2 Assembly

Rear Panel



ASI In



A 75 Ω female BNC connector provides an ASI input.

> NOTE...
> This connector is not used.

Table 3.21: ASI In Connector

Item		Specification
Connector Type		75 Ω BNC Female
Connector designation		ASI IN
Pin-outs	Centre	Signal
	Screen	Ground

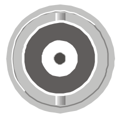
RS-232 Control

A 3.5mm socket provides a debug interface.

> NOTE...
> This connector is for TANDBERG Television use only.

ASI Out

A 75 Ω female BNC connector provides an ASI output.



> NOTE...
> This connector is not used.

Table 3.22: ASI Out Connector

Item		Specification
Connector Type		75 Ω BNC Female
Connector designation		ASI OUT
Pin-outs	Centre	Signal
	Screen	Ground

Ethernet Output

An RJ-45 connector provides a 10/100 BaseT Ethernet port.

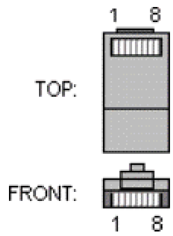


Table 3.23: RJ-45 Connector

Item		Specification
Connector Type		RJ-45
Connector designation		10/100 BT
Pin-out	1	Tx Out (+)
	2	Tx Out (-)
	3	Rx In (+)
	4	Not Connected
	5	Not Connected
	6	Rx In (-)
	7	Not Connected
	8	Not Connected

3.12 Software Options

3.12.1 M2/ESO2/NR

This purchasable option upgrades the Encoder to include noise reduction mode. Contact Customer Services for details.

3.12.2 M2/ESO2/PU

This purchasable option upgrades the performance of the Encoder. Contact Customer Services for details.

3.12.3 M2/ESO2/VBR

This purchasable option upgrades the Encoder to include variable bit-rate. Contact Customer Services for details.

3.12.4 M2/ESO2/422

This purchasable option upgrades the Encoder to include 4:2:2 video encoding mode. Contact Customer Services for details.

3.12.5 M2/ESO2/RAS

This purchasable option upgrades the Encoder to include RAS mode. Contact Customer Services for details.

3.12.6 M2/ESO2/ACON

This purchasable option upgrades the Encoder to include auto concatenation. Contact Customer Services for details.

3.12.7 M2/ESO2/AC3

This purchasable option allows the Encoder to provide Dolby Digital (AC-3) audio. Contact Customer Services for details.

3.12.8 M2/ESO2/SM38PSK

This purchasable option allows the E5740 to provide 8PSK modulation. Contact Customer Services for details.

3.12.9 M2/ESO2/SM316QAM

This purchasable option allows the E5740 to provide 16QAM modulation. Contact Customer Services for details.

3.12.10 M2/ESO2/8PSKDEMOD

This purchasable option allows an E5740 fitted with M2/EOM2/DEC SD decoder and M2/EOM2/SATDEMOD demodulator to receive 8PSK modulated signals. Contact Customer Services for details.

3.12.11 M2/ESO2/16QAMDEMOD

This purchasable option allows an E5740 fitted with M2/EOM2/DEC SD decoder and M2/EOM2/SATDEMOD demodulator to receive 16QAM modulated signals. Contact Customer Services for details.

3.12.12 M2/ESO2/LSYM

This purchasable option allows an E5740 and an M2/EOM2/QPSKDEMOD, if fitted, to work at low symbol rates (300 ksym/s minimum). Contact Customer Services for details.

Chapter 4

Operating the Equipment Locally

Contents

List of Figures

List of Tables

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4.1 Introduction

The front panel display and keypad are used to configure, control and monitor the Encoder. The control interface is a structured menu which gives access to the various options. This chapter describes the menu hierarchy and menu items in detail.

> NOTES...
>
> The configuration of the Encoder after booting is the same as when power was removed, with the following exceptions:
>
> - The satellite modulator output is switched off.
> - The modulation of the IF carrier is switched on.
> - The output power level is set to low.
>
> If the Encoder configuration after power-up, matches the required configuration, then to re-enable transmission the satellite modulator output must be switched on, and the output power level must be set to its previous setting.

4.2 Establishing Local Control (1U)

At switch-on the Encoder runs through a boot sequence (boot time without any option modules is approximately 45 seconds). A typical Summary Screen is displayed.

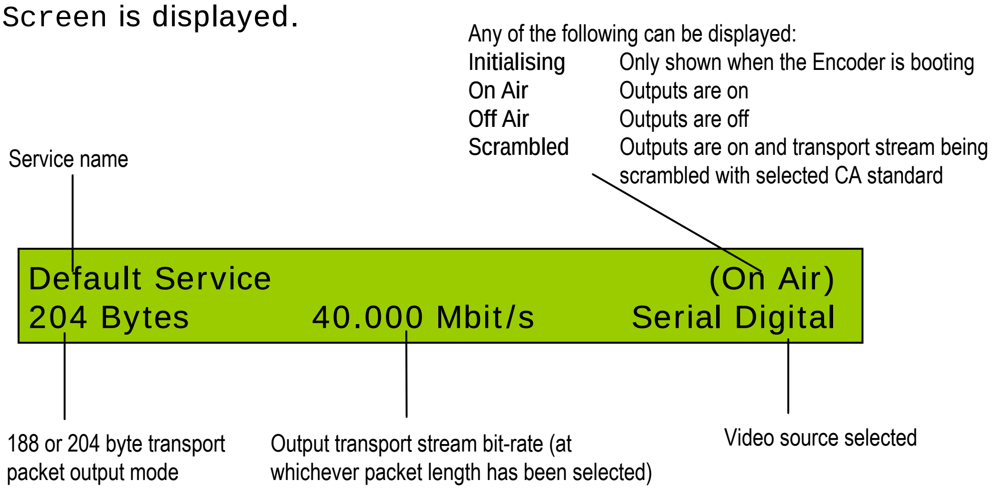


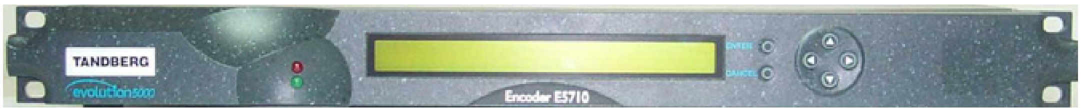
Figure 4.1: 1U Summary Screen

4.3 Navigating the Display Screens (1U)

4.3.1 Introduction

The menu items on the display are selected and amended by one of the four navigation keys (shown as left, right, up and down arrows) and **Enter** and **Cancel** buttons (see *Figure 4.2*). Most of the screens displayed in this manual are for the 2U Encoder and are accessed in a different way (see *Section 4.5, Navigating the Display Screens (2U)*) but the menu options are the same for both the 1U and 2U Encoders.

The function of the navigation keys depends where you are in the menu structure. See the following sections for details.



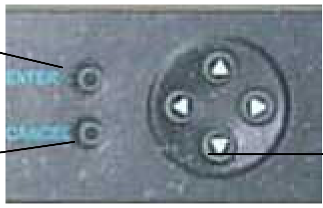


Figure 4.2: 1U Navigation Keys and Buttons

> NOTE...
> The navigation keys are referred to as LEFT, RIGHT, UP and DOWN, indicating the direction of the arrows.

From the `Summary Screen` select the `Main Menu` by pressing ENTER, RIGHT, UP or DOWN.

Return to the `Summary Screen` from the `Main Menu` by pressing LEFT.

The top line of the display shows the menu name and path currently selected. Two characters on the bottom left and right corners of the display indicate which arrow keys are active at any time. These show either an arrow (up, down, left or right) if the key is active, or a dot (.) if the key has no action.

4.3.2 Navigating the Menus (1U)

To navigate the menus:

- DOWN Scrolls down to next option in current menu
- UP Scrolls up to previous option in current menu
- RIGHT Advances to next menu level in hierarchy or selects an item for editing
- LEFT Reverts to previous menu level in hierarchy
- ENTER No action
- CANCEL No action

4.3.3 Changing a Setting (1U)

Overview

Once an item has been selected for editing with the RIGHT key, the setting can be changed (see *For Multiple Choice Entry* on *page 4-11* or *For Text or Numeric Entry* on *page 4-11*). Press ENTER to confirm or CANCEL to discard a new setting.

For Multiple Choice Entry

- DOWN Scrolls down to next option
- UP Scrolls up to previous option
- RIGHT No action
- LEFT No action
- ENTER Accepts new setting
- CANCEL Leaves setting unchanged

For Text or Numeric Entry

The character list for text entry contains the following characters:

space ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz 0123456789/+-=.,:;_!$%^&*(){}[]@'#<>?|

For numeric entry only 0-9 are displayed.

- DOWN Scrolls down through character list
- UP Scrolls up through character list
- RIGHT Moves cursor one character right
- LEFT Moves cursor one character left
- ENTER Accepts new setting
- CANCEL Leaves setting unchanged
- Hold ENTER for two seconds to insert space for a character or digit
- Hold CANCEL for two seconds to delete a space, character or digit

> NOTE...
>
> If the number being entered can be negative then a minus sign can be inserted by pressing LEFT when the cursor is on the left-most digit. This can then be toggled between plus and minus by pressing the UP/DOWN keys.

4.3.4 A(udio)/V(ideo) Menu (1U)

The A/V Menu is designed to give the user fast access to basic audio and video input settings, and operates in a slightly different way to other menus.

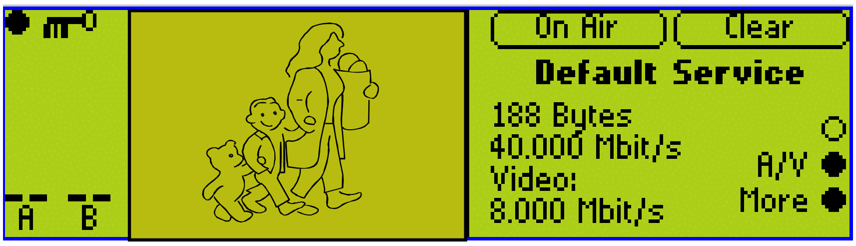
The menu gives a list of video and audio settings and the audio input levels. Any of the settings can be changed by pressing ENTER to cycle through the options. Each time ENTER is pressed the new setting is updated and actioned immediately by the Encoder.

Only those video input selections compatible with the currently selected frame rate can be chosen from this menu. For example, if the current selection is PAL-B/G/H/I (frame rate 25 Hz) then any format except PAL-M or NTSC-M can be selected (29.97 Hz only).

4.4 Establishing Local Control (2U)

4.4.1 Input Monitor

At power-on the Encoder runs through a boot sequence (boot time with Remux option module is approximately 90 seconds). An initial Input Monitor screen is shown. This displays a picture of the currently selected video source, the service name of the video channel being encoded, the audio A and B channels in the form of bargraphs, and the multiplexer and video bit-rates.



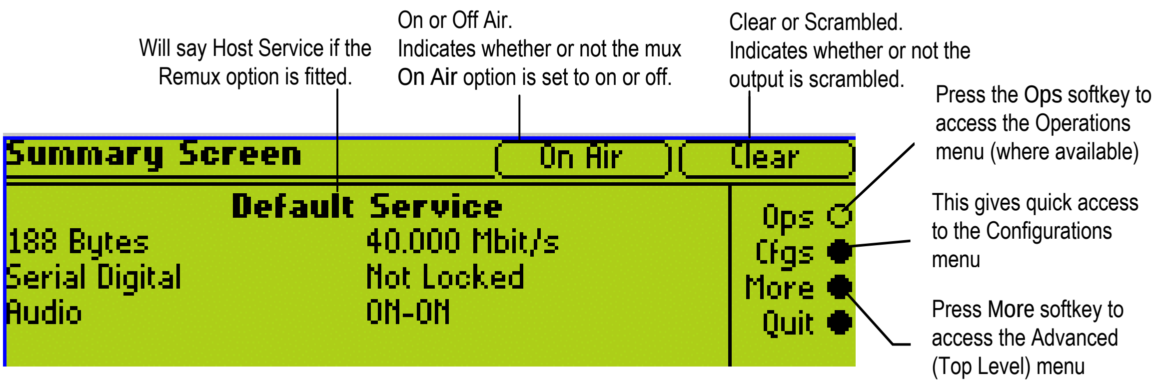
> NOTE...
> The screen may vary slightly in detail between Encoders.

Figure 4.3: 2U Input Monitor

Pressing the **More** softkey displays the `Summary Screen` (see *Section 4.4.2, Summary Screen*).

Pressing the **A/V** softkey displays the **A**`(udio)`**/V**`(ideo) Menu` (see *Section 4.4.3, A(udio)/V(ideo) Menu*).

4.4.2 Summary Screen



> NOTE...
> The screen may vary slightly in detail between Encoders.

Figure 4.4: 2U Summary Screen

> NOTE...
> `The Configurations Menu` can also be accessed through the `Advanced Menu` (see *Figure 4.8*).

4.4.3 A(udio)/V(ideo) Menu (2U)

The A/V Menu contains some basic video and audio options. They can all be changed with the exception of the audio input levels. These are only indicators of the current audio input level and are status only.

Only those video input selections compatible with the currently selected frame rate can be chosen from this menu. For example, if the current selection is PAL-B/G/H/I (frame rate 25 Hz) then any format except PAL-M or NTSC-M can be selected (29.97 Hz only).

4.4.4 Keyboard Lock (2U)

The softkeys can be locked out to prevent inadvertent operation (see the key icon in *Figure 4.5*).

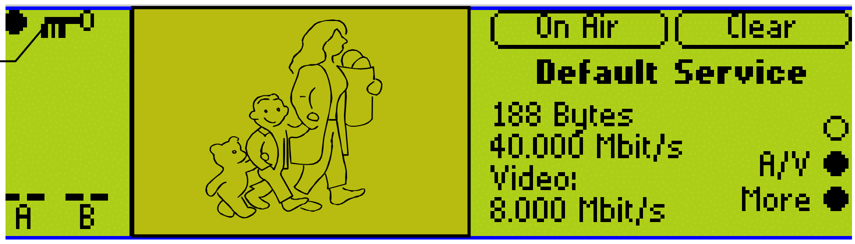


Figure 4.5: Keyboard Lock

Press the softkey adjacent to the key icon. This shows the **Keyboard Lock** screen. Press the **Yes** softkey to disable the softkeys. They are all disabled with the exception of **Unlock**.

To enable and restore the softkey functions, press the **Unlock** softkey. This shows the **Keyboard Lock** screen. Press the **Yes** softkey.

4.5 Navigating the Display Screens (2U)

4.5.1 Moving Through the Menu Screens

Each of the menu items on the display has a connection to a softkey (see *Figure 4.6*). Press the associated softkey to select the required option. Use the **+** and **–** softkeys to scroll through the choices in the option or use the keypad on the far right of the display to change options (unless indicated otherwise in the display). The last item in the right-hand corner of each menu is Quit. This causes the display to revert to the previous menu in the hierarchy. The screens displayed in this manual are only representations - there might be differences between equipment, depending upon the options chosen.

> NOTE...
>
> In the 2U Encoder menus when it states that you may “update using softkeys” you can use both softkeys and keyboard keys for some options.

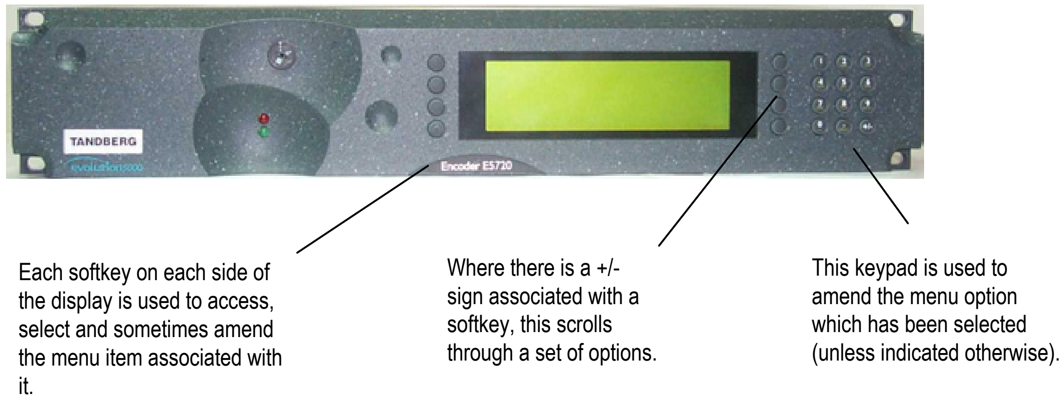


Figure 4.6: 2U Keypad and Display Functions

4.5.2 How to Use the Keypad

Each key on the keypad has more than one inscription. One press of a key makes the number appear on the display screen, two quick presses makes the first letter appear etc. All keys are cyclic, displaying their assigned characters in sequence. In certain options only letters or numbers may be available.

Table 4.1: Keypad Key Assignments

Keypad	Button	1 Press	2 Presses	3 Presses	4 Presses
	1	1	(	:	)
	2	2	A	B	C
	3	3	D	E	F
	4	4	G	H	I
	5	5	J	K	L
	6	6	M	N	6
	7	7	P	R	S
	8	8	T	U	V
	9	9	W	X	Y
	0	0	Space	0	Space
	.	.	O	Q	Z
	+	+	/	-	+

Figure 4.7 gives details of how to access the inscriptions.

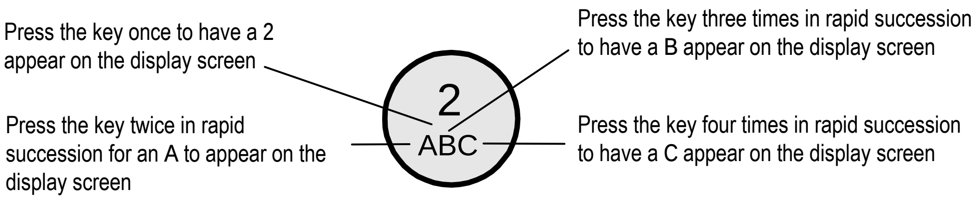
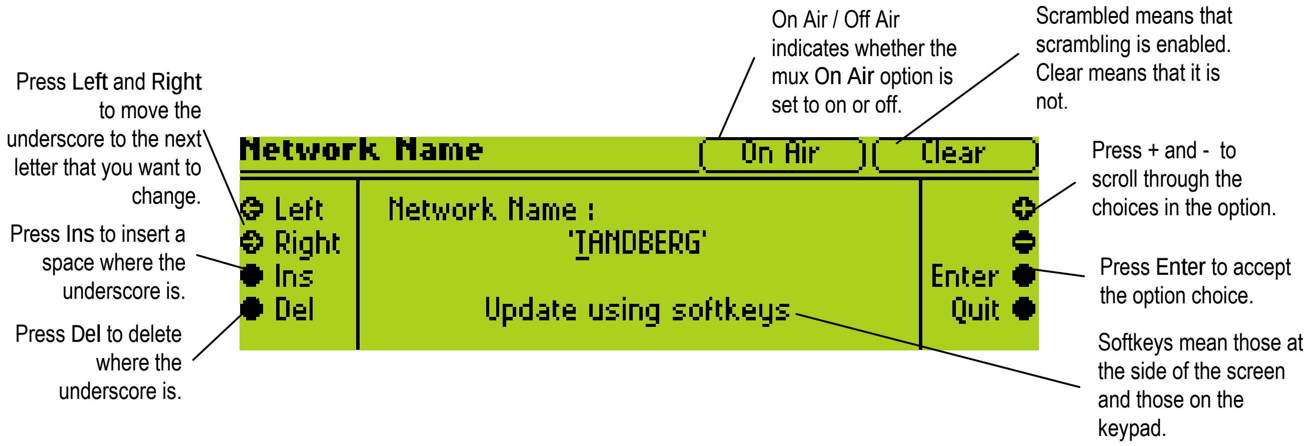


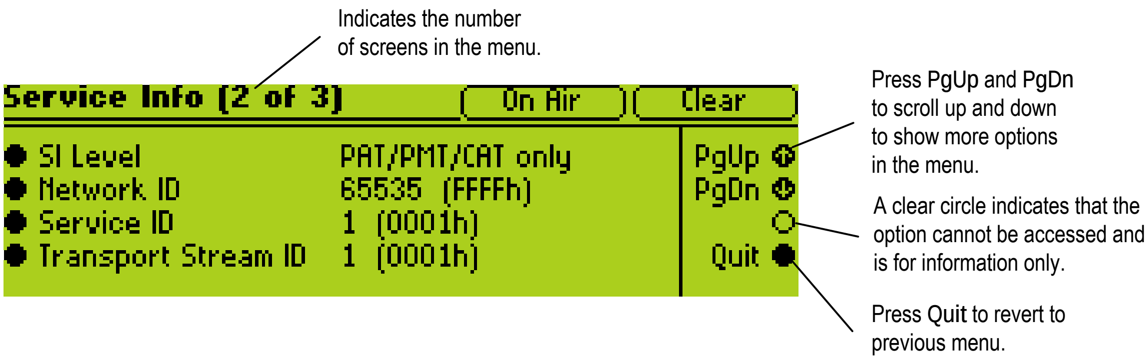
Figure 4.7: Accessing Inscriptions on the Keypad

4.5.3 How to Use the Functions Associated with Softkeys

The following display screens show the different functions associated with the options.



> NOTE...
>
> A black diagonal cross enclosed by a white circle (⊗) means that the Encoder is under remote control and the user does not have access to change that parameter.



4.5.4 Display Screens

The display screens shown in *Section 4.5.3, How to Use the Functions Associated with Softkeys* are identical to those seen on the Encoder front panel display screen. The remainder of the display screens in this chapter are representations and may differ slightly.

4.5.5 Menu Formats

All menus generally conform to the following format. Some of the menus provide access to sub-menus.



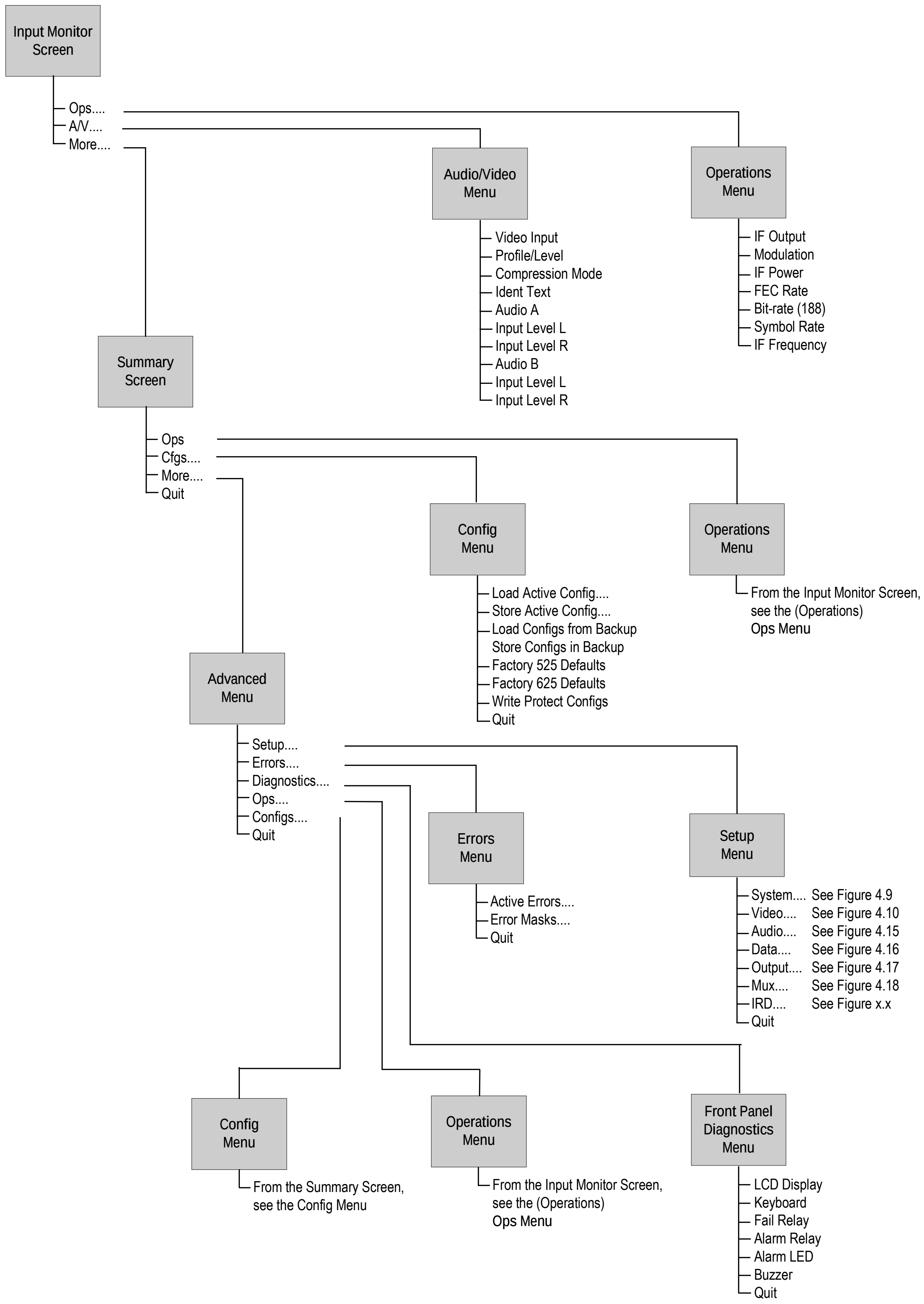


Figure 4.8: Menu Hierarchy – Summary Screen and Advanced Menus

4.5.6 Summary Screen and Advanced Menus

See *Figure 4.8*, for the top-level menu hierarchy. Press the **More** softkey in the `Summary Screen` to access the `Advanced Menu`. The `Advanced Menu` provides options for configuring and testing the Encoder.

4.6 Setup Menu

The `Setup Menu` can be selected from the `Advanced Menu` by pressing the **Setup** softkey (see *Figure 4.8* for menu structure). The menu provides access to configuration and operating features and predefined configurations. If the password option has been set in the `System/Advanced Menu` (see *page 4-29*) then a password will be asked for to access and change a parameter.

4.7 System Menu

4.7.1 Introduction

The `System Menu` is selected from the `Setup Menu` by pressing the **System** softkey (see *Figure 4.9* for menu structure).

This menu permits the selection of system information. Any option with a clear circle next to it cannot be accessed and changed. It is for status information only.

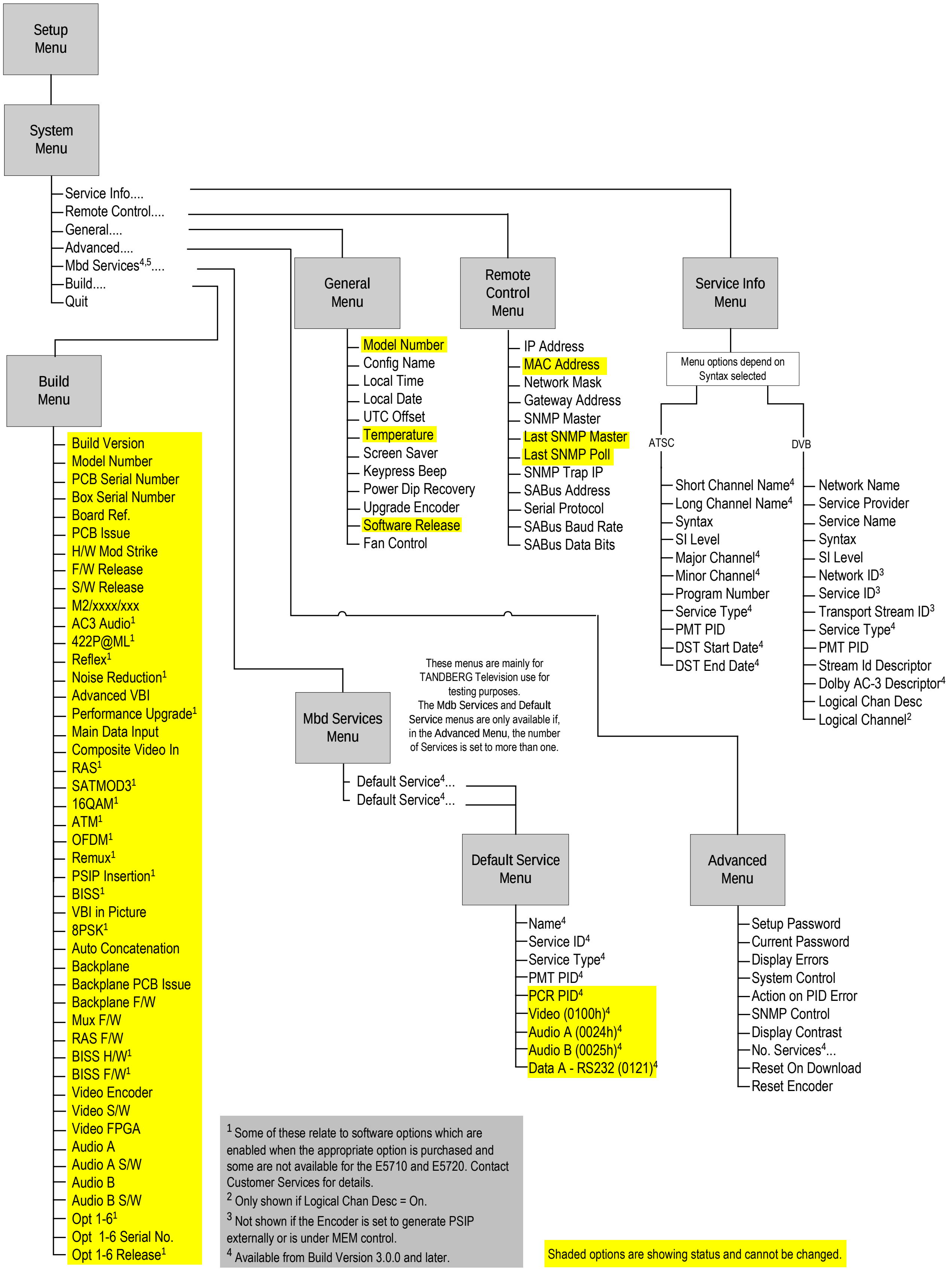


Figure 4.9: Menu Hierarchy – Setup/System Menu

4.7.2 Service Info Menu (Syntax = ATSC[1])

Overview

The Service Info Menu is selected from the System Menu by pressing the **Service Info** softkey. This menu provides options for configuring the Service Information (SI) parameters transmitted in the output transport stream.

See *Figure 4.9* for the menu structure when the Syntax option has been set to **ATSC**.

Short Channel Name Option

This is associated with the field *short_name* and is a seven character name for the channel. To access the Short Channel Name option, press the **Short Channel Name** softkey in the Service Info Menu. This option allows the Short Channel name to be changed. The information is included in the Virtual Channel Table (VCT).

Long Channel Name Option

This is associated with the field *extended_channel_name* and gives the full name of the channel. To access the Long Channel Name option press the **Long Channel Name** softkey in the Service Info Menu.

Syntax Option

To access the Syntax option for the output Transport Stream and associated SI/PSIP, press the **Syntax** softkey in the Service Info Menu. This enables the syntax to be specified. Use the **+** and **–** softkeys to scroll through the options and then press the **Enter** softkey after selecting one of them.

Table 4.2: Syntax Options

Selected Option	Description	Comments
ATSC	Advanced Television Standards Committee.	
DVB	Digital Video Broadcasting.	See *page 4-21*

SI Level Option

To access the SI Level option, press the **SI Level** softkey in the Service Info Menu. This enables the service information level to be specified. Use the **+** and **–** softkeys to scroll through the options and then press the **Enter** softkey after selecting one of them.

[1] For further information refer to ATSC Standard Doc A/65 Program and System Information Protocol for Terrestrial Broadcast and Cable - Annex D.

Table 4.3: SI Level Options

Selected Option	Description
PAT/PMT/CAT only	Program Association Table/ Program Map Table/ Conditional Access Table.
PAT/PMT only	Program Association Table/ Program Map Table.
Off	Elementary streams only.
On	PAT/PMT/CAT/TDT/SDT/NIT/EIT – minimum DVB.
On (No EIT)	PAT/PMT/CAT/TDT/SDT/NIT.

Major Channel Option (3.0 and later)

This is associated with the field *major_channel_number* and is used to group all channels that are to be identified as belonging to a particular broadcast corporation. To access the Short Channel Name option, press the **Major Channel** softkey in the `Service Info Menu`. This option allows the Major Channel name to be changed.

Minor Channel Option (3.0 and later)

This is associated with the field *minor_channel_number* and is used to identify a particular channel within the *major_channel_number* group of channels. To access the Minor Channel option press the **Minor Channel** softkey in the `Service Info Menu`.

Program Number Option

To access the Program Number option, press the **Program Number** softkey in the `Service Info Menu`. This enables the Program Number to be specified. In ATSC this is used as the basis of the PMT PID (same as Service ID in DVB). The information is included in the Program Association Table (PAT), Program Map Table (PMT) and VCT.

> NOTE...
> This option is not displayed if the unit is set to generate PSIP externally or it is under MEM control.

Table 4.4: Program Number Options

Selected Option	Description
Min: 1 Max: 65535 Step Size: 1	Program Number.

Service Type Option (3.0 and later)

To access the Service Type option, press the **Service Type** softkey in the `Service Info Menu`. This option allows the Service Type to be changed.

PMT PID Option

The PMT PID option is found in the `Service Info Menu`. It shows the Program Map Table Packet Identifier and cannot be changed.

DST Start Date Option (3.0 and later)

To access the DST Start Date (Daylight Saving Time) option, press the **DST Start Date** softkey in the `Service Info Menu`. This option allows the Daylight Saving Time Start Date to be changed.

DST End Date Option (3.0 and later)

To access the DST End Date (Daylight Saving Time) option, press the **DST End Date** softkey in the `Service Info Menu`. This option allows the Daylight Saving Time End Date to be changed.

4.7.3 Service Info Menu (Syntax = DVB)

Overview

The `Service Info Menu` is selected from the `System Menu` by pressing the **Service Info** softkey. This menu provides options for configuring the Service Information (SI) parameters transmitted in the output transport stream. See *Figure 4.9* for the menu structure when the Syntax option has been set to **DVB**.

Network Name Option

To access the Network Name option, press the **Network Name** softkey in the `Service Info Menu`. This option allows the network name to be changed. The information is included in the Network Information Table (NIT).

Service Provider Option

To access the Service Provider option press the **Service Provider** softkey in the `Service Info Menu`. This option allows the service provider name to be changed. The information is included in the Service Description Table (SDT).

Service Name Option

To access the Service Name option press the **Service Name** softkey in the `Service Info Menu`. This option allows the service name to be changed. The information is included in the SDT.

Syntax Option

To access the Syntax option for the output Transport Stream and associated SI/PSIP, press the **Syntax** softkey in the `Service Info Menu`. See *Syntax Option, page 4-19* for details.

SI Level Option

To access the SI Level option, press the **SI Level** softkey in the `Service Info Menu`. This enables the service information level to be specified. Use the **+** and **–** softkeys to scroll through the options and then press the **Enter** softkey after selecting one of them.

Table 4.5: SI Level Options

Selected Option	Description
PAT/PMT/CAT only	Program Association Table/ Program Map Table/ Conditional Access Table.
PAT/PMT only	Program Association Table/ Program Map Table.
Off	
On	
On (No EIT)	

Network Id Option

To access the Network Id option, press the **Network Id** softkey in the `Service Info Menu`. This enables the Network Identity to be specified. Use the **+** and **–** softkeys to scroll through the options and then press the **Enter** softkey after selecting one of them. The information is included in the NIT.

> NOTE...
> This option is not displayed if the unit is set to generate PSIP externally or it is under MEM control.

Table 4.6: Network Id Options

Selected Option	Description
Min: 0 Max: 65535 Step Size: 1	Network identity number.

Service Id Option

This option ties the SDT to the PMT and is the same as the Program Number in ATSC. To access the Service Id option, press the **Service Id** softkey in the `Service Info Menu`. This enables the Service Identity to be specified. Use the **+** and **–** softkeys to scroll through the options and then press the **Enter** softkey after selecting one of them. The information is included in the PAT, PMT, SDT, EIT and NIT.

> NOTE...
> This option is not displayed if the unit is set to generate PSIP externally or it is under MEM control.

Table 4.7: Service Id Options

Selected Option	Description
Min: 0 Max: 65535 Step Size: 1	Network identity number.

Transport Stream Id Option

To access the Transport Stream Id option, press the **Transport Stream Id** softkey in the `Service Info Menu`. This enables the Transport Stream Identity to be specified. Use the **+** and **–** softkeys to scroll through the options and then press the **Enter** softkey after selecting one of them. The information is included in the PAT, SDT and NIT.

> NOTE...
> This option is not displayed if the unit is set to generate PSIP externally or it is under MEM control.

Table 4.8: Transport Stream Id Options

Selected Option		Description
Min: Max: Step Size:	0 65535 1	Transport stream identity number.

Service Type Option (3.0 and later)

To access the Service Type option, press the **Service Type** softkey in the `Service Info Menu`. This option allows the Service Type to be changed.

PMT PID Option

To access the PMT PID option, press the **PMT PID** softkey in the `Service Info Menu`. This shows the Program Map Table Packet Identifier. Use the **+** and **–** softkeys to scroll through the options and then press the **Enter** softkey after selecting one of them.

Table 4.9: PMT PID Options

Selected Option		Description
Min: Max: Step Size:	32 8190 (1FFEh) 1	Program Map Table Packet Identifier (PMT PID).

Dolby AC-3 Descriptor Option (3.0 and later)

To access the Dolby AC-3 Descriptor option, press the **Dolby AC-3 Descriptor** softkey in the `Service Info Menu`.

This allows a user to specify only the DVB, only the ATSC, or both the ATSC and DVB descriptors for use with audio streams.

It is necessary because the ATSC descriptor existed prior to the DVB descriptor and some Decoders (e.g. early Alteias) used the AC-3 descriptor for identifying Dolby Digital AC-3 streams.

Use the **+** and **–** softkeys to scroll through the options and then press the **Enter** softkey after selecting one of them.

> NOTE...
> This is only applicable to DVB.

Table 4.10: Audio AC-3 Descriptor Options

Selected Option	Description
DVB & ATSC	Both the ATSC and DVB descriptors are used with the audio streams.
DVB only	Only the DVB descriptors are used with the audio streams.
ATSC only	Only the ATSC descriptors are used with the audio streams.

Logical Chan Desc Option

To access the Logical Chan Desc option, press the **Logical Chan Desc** softkey in the `Service Info` Menu. This enables the Logical Channel Descriptor to be turned On or Off. The information is included in the NIT (for Australia mainly).

Logical Channel Option

> NOTE...
>
> This option is only shown if the Logical Chan Desc option is set to On.

To access the Logical Channel option, press the **Logical Channel** softkey in the `Service Info` Menu. This enables a number to be given to the Logical Channel.

4.7.4 Remote Control Menu

Overview

The `Remote Control` Menu is selected from the `System` Menu by pressing the **Remote Control** softkey. This menu provides options for amending the remote control options. See *Figure 4.9* for the `Remote Control` Menu structure.

IP Address Option

To access the IP Address option, press the **IP Address** softkey in the `Remote Control` Menu.

MAC Address Option

The MAC Address option is found in the `Remote Control` Menu. It cannot be changed.

Network Mask Option

To access the Network Mask option, press the **Network Mask** softkey in the `Remote Control` Menu.

Gateway Address Option

To access the Gateway Address option, press the **Gateway Address** softkey in the `Remote Control` Menu. This gives the default gateway address used on the Ethernet network interface connected via the 10BaseT socket. Any communications to network hosts not on the local IP network will be sent to this address.

SNMP Master Option

To access the SNMP Master option, press the **SNMP Master** softkey in the `Remote Control Menu`. This gives the SNMP Master's IP address. If this is set, only one SNMP controller will be allowed access to the Encoder. It can be set to 000.000.000.000 to allow any controller access.

Last SNMP Master Option

The Last SNMP Master option is found in the `Remote Control Menu`. This gives the last SNMP Master's IP address. It cannot be changed.

Last SNMP Poll Option

The Last SNMP Poll option is found in the `Remote Control Menu`. It cannot be changed

SNMP Trap IP Option

To access the SNMP Trap IP option, press the **SNMP Trap IP** softkey in the `Remote Control Menu`.

If this option is set, trap messages will be sent to the specified IP address. If this is 000.000.000.000 then trap messages will be sent to the last SNMP master.

SABus Address Option

To access the SABus Address option, press the **SABus Address** softkey in the `Remote Control Menu`. The SABus protocol is multi-drop, and has an address byte for differentiating between the devices on the SABus (the address option).

Table 4.11: SABus Address Options

Selected Option		Description
Min:	49	SAbus address.
Max:	127	
Step Size:	1	

Serial Protocol Option

To access the Serial Protocol option press the **Serial Protocol** softkey in the `Remote Control Menu`. This option enables the type of serial protocol to be set.

Table 4.12: Serial Protocol Options

Selected Option	Description
RS485	The type of serial protocol used.
RS232	The type of serial protocol used.

SABus Baud Rate Option

To access the SABus Baud Rate option, press the **SABus Baud Rate** softkey in the `Remote Control Menu`.

Table 4.13: SABus Baud Rate Options

Selected Option	Description
1200	1200 Baud rate.
2400	2400 Baud rate.
4800	4800 Baud rate.

Selected Option	Description
9600	9600 Baud rate.
19200	19200 Baud rate.
38400	38400 Baud rate.

SABus Data Bits Option

To access the SABus Data Bits option, press the **SABus Data Bits** softkey in the `Remote Control` Menu.

Table 4.14: SABus Data Bits Options

Selected Option	Description
8 (1 stop bit)	
7 (2 stop bits)	

4.7.5 General Menu

Overview

The `General Menu` is selected from the `System Menu` by pressing the **General** softkey. This menu provides options for amending the general parameters of the Encoder. See *Figure 4.9* for the `General` Menu structure.

Model Number Option

The Model Number option is shown in the `General Menu`. It cannot be changed.

Config Name Option

To access the Config Name option, press the **Config Name** softkey in the `General Menu`. These are the names of stored Encoder set-ups. They can be recalled from the `Configs Menu` (see *Section 4.17, Configs Menu*).

Local Time Option

To access the Local Time option, press the **Local Time** softkey in the `General Menu`.

Local Date Option

To access the Local Date option, press the **Local Date** softkey in the `General Menu`.

> NOTE...
> Only the + and – softkeys can be used to change the month.

UTC Offset Option

The Universal Time Co-ordinate (UTC) is effectively the same as Greenwich Mean Time (GMT). When including SI in the output transport stream the Encoder is required to output a Time and Date Table (TDT). This uses UTC. Therefore, as the local time is input on the front panel a UTC offset is needed so that the UTC time for the TDT table is generated.

To access the UTC Offset option, press the **UTC Offset** softkey in the `General Menu`.

Table 4.15: UTC Offset Options

Selected Option	Description
Min: –12 Hours Max: 15 Hours Step Size: 1 Hour	UTC offset. A positive value indicates East of Greenwich, and a negative value indicates West of Greenwich.

If the specified UTC offset is outside the valid input range, a confirmation screen is displayed which shows the minimum/maximum value allowed.

Temperature Option

The Temperature option is shown in the `General Menu`. It indicates the current internal temperature.

Screen Saver Option

To access the Screen Saver option, press the **Screen Saver** softkey in the `General Menu`.

Table 4.16: Screen Saver Options

Selected Option	Description
Top Level Menu	If no changes have been made to the Encoder for five minutes (no softkey has been pressed) the chosen screen saver appears on the front panel display.
Van	
TANDBERG	
Service Name	
Off	

Keypress Beep Option

To access the Keypress Beep option, press the **Keypress Beep** softkey in the `General Menu`.

Table 4.17: Keypress Beep Options

Selected Option	Description
On	A beep sounds every time that a key is pressed.
Off	There is silence every time that a key is pressed.

Power Dip Recovery Option

To access the Power Dip Recovery option, press the **Power Dip Recovery** softkey in the `General Menu`.

Table 4.18: Power Dip Recovery Options

Selected Option	Description
On	The outputs are restored following a power dip.
Off	The outputs are not restored following a power dip.

Upgrade Encoder Option

There are a number of features which are not enabled by default. Refer to *Chapter 3, Options and Upgrades, Table 3.1* for details.

To enable these features, access the Upgrade Encoder option and press the **Upgrade Encoder** softkey in the `General Menu`. This shows the serial number of the box, which is in the range of 0 to 65535. Send this number to TANDBERG Customer Services and they will return a software licence key to enter via the front panel to enable the features.

> NOTE...
> These software options must be purchased before the software licence key is sent.

Software Release Option

The software release is shown in the `General Menu`. It cannot be changed.

Fan Control Option

To access the Fan Control option, press the **Fan Control** softkey in the `General Menu`. Refer to *Annex B, Technical Specification, Table B.19* for more information about the temperatures at which fans activate and deactivate.

Table 4.19: Fan Control Options

Selected Option	Description
Auto (Temp. control)	The fans are activated automatically when a defined temperature is reached.
On	The fans are activated all the time.

4.7.6 Advanced Menu

Overview

The Advanced Menu is selected from the System Menu by pressing the **Advanced** softkey. This menu provides options for the advanced parameters of the Encoder. See *Figure 4.9* for the Advanced Menu structure.

Setup Password Option

There is no password originally required to edit parameters so if one is needed then it must be set. To access the Setup Password option, press the **Setup Password** softkey in the Advanced Menu. The password can be either on or off.

Current Password Option

To access the Current Password option, press the **Current Password** softkey in the Advanced Menu. This allows the current password to be changed.

> NOTE...
> For forgotten passwords, contact Customer Services.

Display Errors Option

To access the Display Errors option, press the **Display Errors** softkey in the Advanced Menu. This displays or hides relevant error messages according to whether the option is set On or Off.

System Control Option

To access the System Control option press the **System Control** softkey in the Advanced Menu. This option enables the type of system control specified in the SI to be set.

Table 4.20: System Control Options

Selected Option	Description
MEM	Control of the video/audio delay (lip sync) is via the MEM.
Local	Control of the video/audio delay (lip sync) is within the Encoder[2].
External (SNMP)	Control of the video/audio delay (lip sync) is via the SNMP protocol.

If the control equipment is a TT7000 System Manager, ensure that the **Auto Lip Sync** option is turned on (see *Auto Lip Sync Option* on *page 4-56*). The TT7000 does not have a lip sync function therefore the Encoder has to provide this.

[2] To ensure correct lip sync when working with linear or pre-encoded audio, the option card M2/EOM2/AUDLIN should be used.

Action On PID Error Option

To access the Action on PID Error option, press the **Action on PID Error** softkey in the Advanced Menu.

Table 4.21: Action on PID Error Options

Selected Option	Description
Raise Alarm	An error message is displayed if a PID error is found.
Auto Correct	If a PID error is found it is automatically corrected.

SNMP Control Option

To access the SNMP Control option, press the **SNMP Control** softkey in the Advanced Menu.

Table 4.22: SNMP Control Options

Selected Option	Description
No Reply/Initialisation	No SNMP reply during initialisation.
No Lockout/Initialisation	Reply as modules start to appear.

Display Contrast Option

> NOTE...
> When this softkey is pressed, the display changes immediately.

To access the Display Contrast option, press the **Display Contrast** softkey in the Advanced Menu. This option allows the contrast ratio of the LCD display to be set. The contrast range is: Very Light, Light, Medium, Dark, Very Dark. As the key is pressed the display changes.

If the background is set to very dark or very light, the text may not be visible. In this instance, view the display at an acute angle, this should enable the text to be seen enough to change the contrast.

No. Services Option (3.1 and later)

To access the No. Services option, press the **No. Services** softkey in the Advanced Menu. There can be up to four services.

Reset On Download Option

To access the Reset On Download option, press the **Reset On Download** softkey in the Advanced Menu. the option can be Yes or No. If Yes, the Encoder automatically reboots following a download, keeping the current configuration. If No, the Encoder keeps working normally.

Reset Encoder Option

To access the Reset Encoder option, press the **Reset Encoder** softkey in the Advanced Menu. A confirmation message appears “Reset Encoder – Are you sure?”. If Yes is selected the Encoder immediately reboots, keeping the current configuration. If No, the Encoder keeps working normally.

CAUTION...

The Reset Encoder option is not normally used.
One example of its use is when code has been downloaded in background mode (such as Base Board code or Video Compression Module (VCM) code) and you want to reset the Encoder, to action the new code.

4.7.7 Build Menu

The `Build Menu` is selected from the `System Menu` by pressing the **Build** softkey. The `Build Menu` shows the status of the options shown in *Figure 4.9*. They cannot be changed.

4.8 Video Menu

4.8.1 Introduction

The `Video Menu` is selected from the `Setup Menu` by pressing the **Video** softkey. This menu permits the selection of video parameters. Any option with a clear circle next to it cannot be accessed and changed. It is for status information only (see *Figure 4.10* for menu structure).

4.8.2 Video Source Menu

Overview

The `Video Source Menu` is selected from the `Video Menu` by pressing the **Video Source** softkey. This menu permits the selection of video source parameters. The screens vary according to the type of video source selected.

Video Input Option

To access the Video Input option, press the **Video Input** softkey from the `Video Source Menu`.

Table 4.23: Video Input Options

Video Type	Selected Option	Description
None	Off	Video input switched off.
Analogue Composite	PAL-B/G/H/I	PAL-B/G/H/I composite video input on COMP VIDEO connector.
	PAL-D	PAL-D composite video input on COMP VIDEO connector.
	PAL-M	PAL-M composite video input on COMP VIDEO connector.
	NTSC with Pedestal	NTSC-M composite video input (with Pedestal) on COMP VIDEO connector.
	NTSC No Pedestal	NTSC-M composite video input (with no Pedestal) on COMP VIDEO connector.
Ident, Digital and Internal Test Pattern Video Sources	Serial Digital	Serial digital video input on SDI IN connector.
	Bars & Red	Colour bars and red internal test pattern.
	Black	Black internal test pattern.
	Moving Pattern	Moving internal test pattern.
	Ident	Video Source which allows the user to superimpose identification text on the video. Mainly used for test purposes.

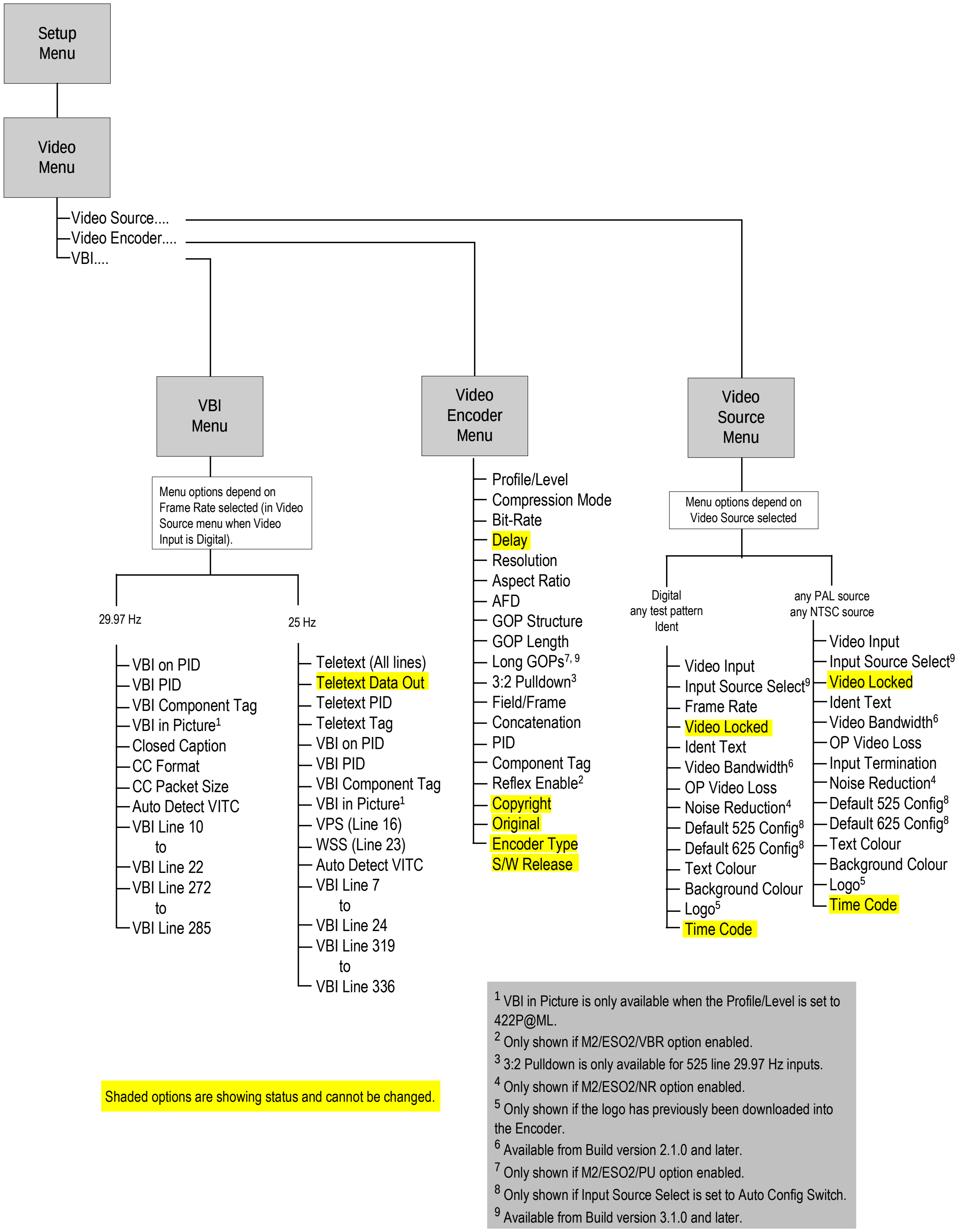


Figure 4.10: Menu Hierarchy – Setup/Video Menu

Input Source Select

> NOTE...
> This option is available in Build version 3.1.0 and later.

To access the Input Source Select option, press the **Input Source Select** softkey from the `Video Source Menu`. This allows the enabling or disabling of automatic frame rate detection.

Table 4.24: Input Source Select Options

Selected Option	Description
Manual	The frame rate must be set via the Frame rate option.
Auto Frame Rate	The frame rate is automatically detected.
Auto Config Switch	The frame rate is automatically detected, and the Encoder loads the appropriate config defined by Default 525 Config and Default 625 Config.

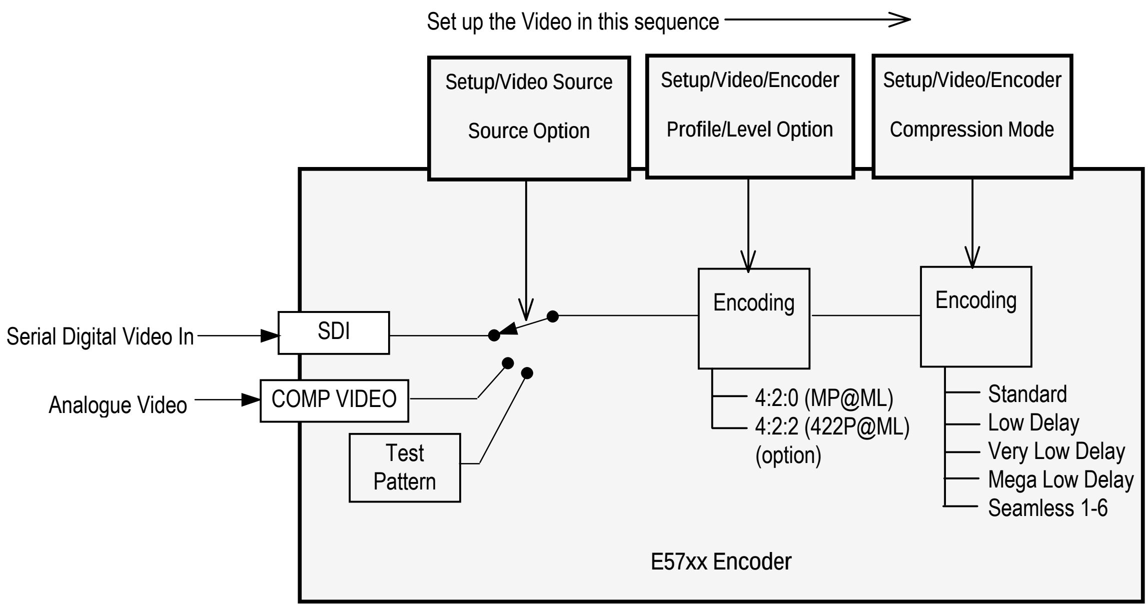


Figure 4.11: Setting up the Video Input

Frame Rate Option

> NOTE...
> The frame rate is only shown when the video input is Serial Digital, any Test Pattern or Off.

To access the Frame Rate option, press the **Frame Rate** softkey from the `Video Source Menu`.

Table 4.25: Frame Rate Options

Selected Option	Description
29.97 Hz	Used in 525 lines (NTSC-M + PAL-M).
25 Hz	Used in 625 lines (PAL).

Video Locked Option

This option indicates whether the video is locked. It is for status only and cannot be changed.

Ident Text Option

To access the Ident Text option, press the **Ident Text** softkey from the `Video Source Menu`. This is the text that is displayed if the video output is lost (see *OP Video Loss Option*, on *page 4-35*).

Text Colour Option

To access the Text Colour option, press the **Text Colour** softkey from the `Video Source Menu`. This gives a choice of colours for the text which is displayed when the video output is lost (if that option has been selected).

Table 4.26: Text Colour Options

Available Options					
White	Blue	Magenta	Yellow	Green	Pink
Black	Red	Orange	Grey	Cyan	

Background Colour Option

To access the Background Colour option, press the **Background Colour** softkey from the `Video Source Menu`. This gives a choice of colours for the background to the text which is displayed when the video output is lost (if that option has been selected).

> CAUTION...
>
> Make the background colour a contrast to the text otherwise the text will not be seen!

Table 4.27: Background Colour Options

Available Options					
White	Blue	Magenta	Yellow	Green	Pink
Black	Red	Orange	Grey	Cyan	

Video Bandwidth Option

> NOTE...
>
> This option is available in Build version 2.1.0 and later.

The Video Bandwidth Option controls the filtering of the video before it is compressed. Reducing the bandwidth requires slightly less bits in the compressed bit-stream. Refer to *ST.AN.BW.E10074* for more information.

To access the Video Bandwidth option, press the **Video Bandwidth** softkey from the `Video Source Menu`.

Table 4.28: Video Bandwidth Options

Selected Option	Description
Sharp	Filter is at the maximum bandwidth possible for the resolution selected.
Medium	Slightly reduced bandwidth.
Soft	Reduced a little further.
Auto	Slightly reduced bandwidth.

OP Video Loss Option

This option gives the choice of what is displayed on the television screen in the event of losing video input. To access the OP Video Loss option, press the **OP Video Loss** softkey from the `Video Source Menu`.

Table 4.29: OP Video Loss Options

Selected Option	Description
Freeze Frame	The last video frame received is encoded if the video input is lost.
Black	A black screen is encoded if the video input is lost.
Bars & Red	Bars and red test pattern is encoded if the video input is lost.
Freeze + Ident	The last video frame received is encoded if the video input is lost. Text message is superimposed.
Black + Ident	A black screen is encoded if the video input is lost. Text message is superimposed.
Bars & Red + Ident	Bars and red test pattern is encoded if the video input is lost. Text message is superimposed.

Input Termination Option

To access the Input Termination option, press the **Input Termination** softkey from the `Video Source Menu`. This enables the termination of the analogue video input to be switched On or Off.

Noise Reduction Option[3]

This option enables the noise reduction feature to be switched on (at different levels) or off. The feature can be used when the incoming picture material is corrupted by high frequency noise (such as white noise). When noise reduction is enabled, the Encoder applies sophisticated edge preserving filters on the incoming material and removes the noise which can reduce the encoding difficulty considerably.

To access the Noise Reduction option, press the **Noise Reduction** softkey from the `Video Source Menu`.

The three levels of noise reduction are in increasing order of noise reduction capability. They are independent of video content. All three settings are noise-level adaptive, i.e. it is not necessary to change the setting for different noise levels.

Once a level has been selected it can be left enabled. When a clean source is used the noise reduction dynamically switches off and then back on when noise is present. Refer to *Application Note ST.AN.1094, Video Noise Reduction and Compression* for more information.

[3] Noise reduction is only available when software option M2/ESO2/NR is purchased.

Table 4.30: Noise Reduction Options

Selected Option	Description
Off	
Level 1	Use noise reduction, if necessary, but don't 'damage' the picture in any way.
Level 2	Medium setting (best compromise), quite powerful, but noise reduction might, very occasionally, introduce some artefacts.
Level 3	Very powerful noise reduction that may introduce some artefacts.

Default 625 Config and Default 525 Config[4]

> NOTE...
> These options are available in Build version 3.1.0 and later.

To access the Default 525/625 Config options, press the appropriate **Default 525 / 625 Config** softkey from the `Video Source Menu`. These options define which of the stored configs are loaded.

Logo Option (When Logo Downloaded into Unit)

To access the Logo option, press the **Logo** softkey from the `Video Source Menu`. This gives the choice of superimposing the broadcaster's logo on the video (On) or not (Off).

> NOTE...
> This option only appears if the logo has previously been downloaded into the equipment (see *Annex E, Creating and Downloading a Logo*).

Time Code Option

This option indicates the time given by the Vertical Interval Time Code (VITC) or generated by the Encoder. It is for status only and cannot be changed.

4.8.3 Video Encoder Menu

Overview

The `Video Encoder Menu` is selected from the `Video Menu` by pressing the **Video Encoder** softkey. This menu permits the selection of video encoding parameters.

Profile / Level Option

> NOTE...
> This option is always MP@ML and cannot be changed unless the M2/ESO2/422 software option is enabled.

To access the Profile/Level option, press the **Profile / Level** softkey in the `Video Encoder Menu`.

[4] These options are only shown when the **Input Source Select** option is set to Auto Config Switch.

Table 4.31: Profile/Level Options

Selected Option	Description
MP@ML	Main Profile @ Main Level. Typically used in 4:2:0 direct to home.
422P@ML	4:2:2 Profile @ Main Level. Typically used in 4:2:2 contribution feed.[5]

Compression Mode Option

To access the Compression Mode option, press the **Compression Mode** softkey in the `Video Encoder Menu`. This enables various compression modes to be selected in which some encoding parameters are automatically controlled depending on the selected encoding delay.

> NOTES...
> 1. Changing compression causes a change to GOP structure and length.
> 2. Picture quality may decrease with reduced delay.

Table 4.32: Compression Mode Options

Selected Option	Description
Seamless 1	This gives a fixed delay which allows the bit-rate to be changed, over the permitted range, without a break in transmission.
Seamless 2	
Seamless 3	
Seamless 4	
Seamless 5	
Seamless 6	
	In the following modes the delay is a function of the bit-rate selected. If the bit-rate is changed there is a break in transmission.
Mega Low Delay	The generated transport stream is not fully DVB compliant and may not work with all Decoders. The delay is reduced by not allowing B frames but using field pictures and other techniques.
Very Low Delay	Delay is reduced using the same techniques as Low Delay mode. GOP structure used is IP and field pictures are used.
Low Delay	Delay is reduced by reducing the size of the video rate buffer. This compromises video quality in some circumstances.
Standard	The normal mode, with no special techniques or fixed settings to reduce encoding delay.

> NOTE...
> See *Chapter 3, Options and Upgrades, Section 3.2, Bit-rate Limits With Reflex Licence and/or Performance Upgrade* for possible differences with different combinations of Performance Upgrade (M2/ESO2/PU) and Reflex/VBR Licence (M2/ESO2/VBR).

[5] 4:2:2 is not available unless the M2/ESO2/422 software option is enabled.

Table 4.33: Seamless Mode Bit-rate (Full Resolution Only)

Profile	Seamless 1 (Mbit/s)	Seamless 2 (Mbit/s)	Seamless 3 (Mbit/s)	Seamless 4 (Mbit/s)	Seamless 5 (Mbit/s)	Seamless 6 (Mbit/s)
4:2:0	0.8 - 10	1.5 - 10	2 - 15	0.4 - 10	1 - 12	1.3 - 10
4:2:2	1.5 - 13	3 - 27	5 - 33	0.7 - 10	2.1 – 2.5	2.5 - 20
Rate Buffer delay	2.5 s	1.2 s	1 s	3.3 s	1.3 s	1 s

Seamless 1 mode can use video bit-rates from 0.8 Mbit/s to 10 Mbit/s, with the actual limits depending on video standard and resolution. This would be used for 4:2:0 DTH statistical multiplexing applications. The Encoder delay is approximately 2.5 seconds.

Seamless 2 mode emulates System 3000 6U and 6U+ Encoders. Video bit-rate can be between 1.5 Mbit/s and 10 Mbit/s. Actual minimum and maximum rates depend on video standard and resolution.

Seamless 3 mode operates between 5 Mbit/s and 33 Mbit/s, with the actual limits depending on video standard and resolution. It would usually be used in 4:2:2 statistical multiplexing applications. The Encoder delay is approximately 1.1 seconds.

Seamless 4 mode has a very low B_{min}. Actual minimum and maximum depend on the video standard and resolution. This mode would typically be used for 4:2:0 DTH statistical multiplexing applications.

Seamless 5 mode minimum and maximum depend on the video standard and resolution.

Seamless 6 mode is typically used with 4:2:2 statistical multiplexing and a low B_{min}. Actual minimum and maximum depend on the video standard and resolution.

> NOTE...
>
> In Seamless Modes 4, 5 and 6 coding performance is compromised a little to achieve lower B_{min}s.

Bit-rate Option

To access the Bit-rate option, press the **Bit-rate** softkey in the Video Encoder Menu. An error message is shown with the correct range of bit-rates if the wrong rate is entered.

> NOTE...
>
> High bit-rates in low resolutions cannot always generate sufficient bits to match the requested bit-rate. However, a valid picture will still be produced.

> CAUTION...
>
> When using the Encoder with a PRO IRD M2/PSR/3/422BAS in 4:2:2 mode the upper video bit-rate limit of the IRD is 25 Mbit/s.

VBR Mode Option

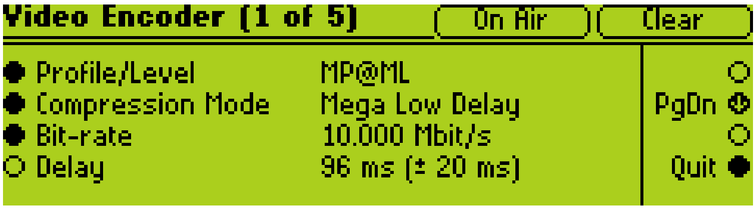
> NOTE...
>
> This option is available in Build version 3.0 and later.

It is possible to operate the Encoder in a stand-alone Variable Bit-rate (VBR) mode. When in this mode the bit-rate generated by the video encoder ranges between a minimum (Bmin - dependent on Compression Mode) and a maximum (Bmax - set by user, up to a limit defined by the Compression Mode). The video encoder attempts to use a bit-rate to achieve a particular picture quality set by the user.

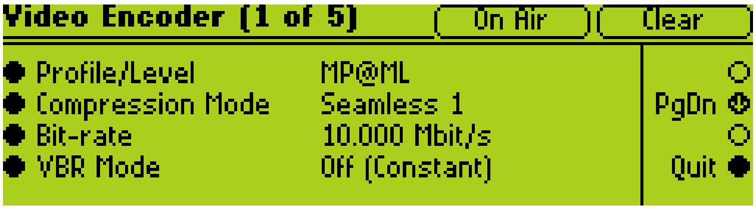
If this is set very high then the generated bit-rate clips at the Bmax value. If it is set very low then the bit-rate clips at Bmin. Somewhere in-between the bit-rate varies, depending on the picture material being encoded. Simple pictures use a lower bit-rate than complex pictures.

When in this mode the main encoder output remains at the bit-rate set within the Mux menu and any spare unused bit-rate is filled with stuffing packets. These could optionally be removed and reinserted by some equipment between the Encoder and Decoder.

A typical view of the Video Encoder menu would be:

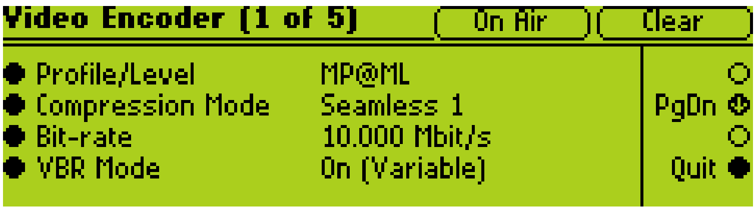


To run in VBR mode the Encoder must be placed into a Seamless Compression mode.



A new menu item **VBR Mode** then appears. When set to Off (Constant) the Encoder generates a fixed constant bit-rate set by the **Bit-rate** option.

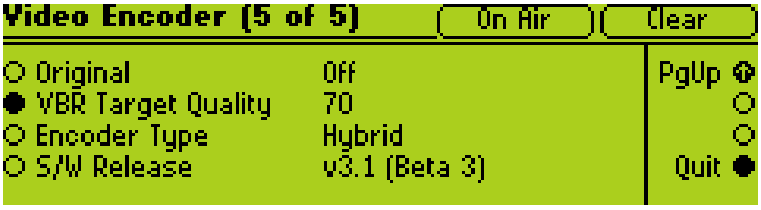
When changed to On (Variable) the Encoder enters its stand-alone **VBR Mode**.



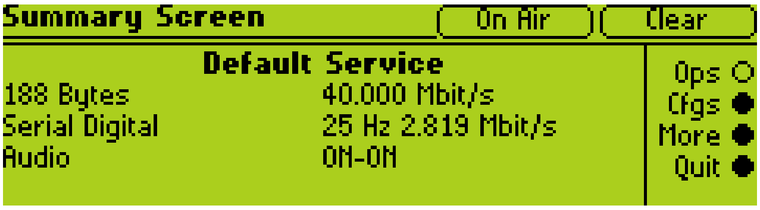
A new menu item appears **Max (VBR) Bit-rate**. This is the maximum bit-rate the Encoder will generate. The read-only menu item **Bit-rate** remains, but now indicates the bit-rate being generated by the Encoder.

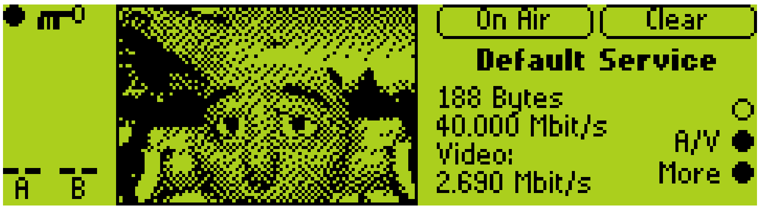


The required picture quality is set in the same menu by the **VBR Target Quality** item.



When running in VBR Mode the two top-level status screens show the current bit-rate being used. This will typically vary.





Delay Option

This option indicates the current video delay. It is for status only and cannot be changed.

Resolution Option

This option gives both horizontal and vertical resolution. To access the Resolution option, press the **Resolution** softkey in the Video Encoder Menu.

Table 4.34: Resolution Options

In Auto, pixel value in brackets varies with bit-rate that is set.

Selected Option		Description
625 Line Modes	525 Line Modes	
Auto (720x576)	Auto (720x480)	Relates to the number of pixels across the screen and the number of lines down the screen (pixels x lines).
720 x576	720 x480	
704 x576	704x480	
640 x576	640x480	
544 x576	544x480	
480 x576	480x480	
352x576	352x480	
352x288 (SIF)	352x240 (SIF)	

Aspect Ratio Option

To access the Aspect Ratio option, press the **Aspect Ratio** softkey in the `Video Encoder Menu`. This option does not affect the image processing.

Table 4.35: Aspect Ratio Options

Selected Option	Description
1, 0	Video image is encoded at 1:1 aspect ratio. Not currently used.
4:3	Video image is encoded at 4:3 aspect ratio. Default.
16:9	Video image is encoded at 16:9 aspect ratio.
2.21:1	Video image is encoded at 2.21:1 aspect ratio. Not currently used.

AFD Option

Active Format Descriptor (AFD) uses three bits of video index to define the video format. This information is encoded into user data and can then be used by a Decoder for wide-screen switching. To access the AFD option, press the **AFD** softkey in the `Video Encoder Menu`.

Table 4.36: AFD Options

Selected Option	Description
Off	No AFD data output.
On	Output AFD value zero if input is lost.
On (No Action on Error)	If the input is lost, carry on outputting last valid data.

> NOTE...
>
> 625 line – with AFD set to On, lines 11 and 324 will be set to Video Index.
>
> 525 line – with AFD set to On, lines 14 and 277 will be set to Video Index.

Table 4.37: AFD Information

Video Input	Encoder Video Index Extraction	Encoder AFD off		Encoder AFD on		Encoder AFD on (No action on Error)	
		Sequence_header aspect_ratio_information	AFD user_data() active_format	sequence_header aspect_ratio_information	AFD user_data() active_format	sequence_header aspect_ratio_information	AFD user_data() active_format
Present	ON	Aspect ratio from Video Index	Not present	Aspect ratio from Video Index	AFD value from Video Index	Aspect ratio from Video Index	AFD value from Video Index
Present	OFF	Encoder setting	Not present	Encoder setting	0 (Active region is the same as encoded frame)	Stays at last aspect ratio extracted from Video Index	Stays at last value extracted from Video Index (This could be 0)
No input or Present but no Video Index data	ON	Encoder setting	Not present	Encoder setting	0 (Active region is the same as encoded frame)	Stays at last aspect ratio extracted from Video Index	Stays at last value extracted from Video Index (This could be 0)
No input or Present but no Video Index data	OFF	Encoder setting	Not present	Encoder setting	0 (Active region is the same as encoded frame)	Stays at last aspect ratio extracted from Video Index	Stays at last value extracted from Video Index (This could be 0)

GOP Structure Option

To access the Group of Pictures (GOP) Structure option, press the **GOP Structure** softkey in the Video Encoder Menu.

Table 4.38: Group of Pictures Structure Options

Selected Option	Description
IBBBP	(IBBBPBBBPBBBI).
IBBP	for successive B frames (IBBPBBPBBPBBPI) – default.
IBP	for operation with B frames (IBPBPBPBPBPI).
IP	for non-B frame operation (IPPPPPPPPPPI) - default for low delay mode.
IBBB	(IBBBIBBBIBBBIBBB) - professional editing standard.
IBB	IBBIBBIBBIBBIBBI) - professional editing standard.
IB	(IBIBIBIBIBIBIBIB) - a professional editing standard.
I-Frame	(IIIIIIIIIIIIII) - for precise editing and compression.

NOTE...
For some GOP changes operation can be seamless but this is not guaranteed.

GOP Length Option

To access the Group of Pictures (GOP) Length option, press the **GOP Length** softkey in the Video Encoder Menu.

This enables the video GOP structure length to be set. The structure length determines how regularly an I frame is transmitted. The I frame provides a regular reference from which predicted frames can be generated, thereby ensuring that predictions do not become wildly inaccurate.

> NOTE...
> Some of the settings may not be available if they are not valid for use with other current encoding parameters. Also, changing the GOP structure automatically changes the GOP length if the current GOP length is not compatible with the selected structure.

Table 4.39: Group of Pictures Length Options (Long GOPs Disabled)

Valid Input Range	Description
Min: 1 Max: 15	GOP lengths available depend on GOP structure selected and the frame rate. Maximum GOP lengths are 12 for 25 Hz and 15 for 29.97 Hz.
	I-Frame and IP encoding have 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15.
	IBP and IB have 2, 4, 6, 8, 10, 12, 14.
	IBBP and IBB have 3, 6, 9, 12, 15.
	IBBBP and IBBB have 4, 8, 12.

Long GOPs Option (3.1 and later)

> NOTES...
> 1. This option is available in Build version 3.1.0 and later.
> 2. Only available if M2/ESO2/PU has been purchased.

To access the Long GOPs option, press the **Long GOPs** softkey in the Video Encoder Menu. This is used to enable or disable the use of GOP structures that are longer than 500 ms in duration.

Long GOP structures can improve video encoding performance, particularly at low bit-rates. However, it can lead to compression artefacts being visible on scene cuts, and a periodic build-up and removal of noise at the I-frame rate.

> NOTE...
> Long GOPs are not DVB compliant, and should be used with caution.

Field/Frame Option

To access the Field/Frame option, press the **Field/Frame** softkey in the Video Encoder Menu. This enables the choice of field or frame based pictures.

MPEG-2 encodes video at the field/frame level in what are known as pictures. These are coding units within the hierarchy of the spec. **Pictures** can be used in two ways, frame pictures and field pictures.

With frame pictures a **frame** of a field 1 and field 2 is encoded as a single unit. With field pictures each individual **field** of video is encoded as a single unit, but must be followed or preceded by another **field picture** relating to its matching field.

Table 4.40: Field/Frame Options

Selected Option	Description
Fields	Field based pictures.
Frames	Frame based pictures.
Auto	Automatically chooses the correct option on a frame by frame basis.

3:2 Pulldown Option

To access the 3:2 Pulldown option, press the **3:2 Pulldown** softkey in the `Video Encoder Menu`. This enables 3:2 pulldown (film) mode to be switched On and Off.

NOTES...

1. This option is only available if a **525 line 29.97 Hz** video source is selected.
2. VBI in Picture is not supported when 3:2 Pulldown is active.
3. 3:2 Pulldown is not valid for Very Low Delay and Mega Low Delay coding modes.
4. It is recommended to set this option to On.

The option should be switched on if the video material originated on film and has been converted from the 24 frames per second film rate to the 29.97 frames per second NTSC rate. This enables the Encoder to increase the video compression by only including a flag in the transport stream to represent a repeated field (when detected), rather than compressing the repeated fields.

Concatenation Option

NOTES...

1. Auto Concatenation is only available when software option M2/ESO2/ACON is purchased.
2. Concatenation is only available if the video source is SDI.

Use this option if the signal has been coded, then decoded and is about to be coded again. It reduces picture degradation associated with multiple generation compression encoding. Setting this option may give better results as it tries to line up the I-frames. Only available to video via the SDI input. See *Application Note, ST.AN.1110, Near Loss-less MPEG Concatenation Without Helper Signals*.

PID Option

The PID option is selected from the `Video Encoder Menu` by pressing the **PID** softkey. The option is used for entering or updating video PIDs, as required. Enter a PID then press the **Enter** softkey to accept it.

To be DVB compliant, PIDs below 32 are reserved. Therefore PIDs 32 to 8191 are available for use. In the event of a clash, one of the PIDs will be changed by the Encoder's internal checking algorithm.

Reflex Enable Option

The Reflex Enable option is selected from the `Video Encoder Menu` by pressing the **Reflex Enable** softkey. The option is used to enable (On) or disable (Off) Reflex.

Copyright Option

This option indicates whether the information in the bit-stream is shown to be protected by copyright. It is for status only and cannot be changed.

Original Option

This option indicates whether the bit-stream is an original or a copy of an original bit-stream. It is for status only and cannot be changed.

Bandwidth Option

See *Video Bandwidth Option* on *page 4-34*.

Encoder Type Option

This option indicates the type of Encoder. It is for status only and cannot be changed.

S/W Release Option

This option indicates the software release of the Encoder. It is for status only and cannot be changed.

4.8.4 Vertical Blanking Interval (VBI) Menu

Overview

The VBI Menu is selected from the Video Menu by pressing the **VBI** softkey. This menu permits the selection of VBI parameters.

The VBI lines vary, according to whether the video source is 525 lines, 29.97 Hz or 625 lines, 25 Hz. If 525, the options are VBI Lines 10-22 and 272-285; if 625, the options are VBI Lines 7-24 and 319-336.

> NOTE...
>
> A maximum of eight VBI lines per field may be extracted. This limit does not apply to Teletext.

Teletext (All lines) Option

> NOTE...
>
> This option is only available when Frame Rate is 25 Hz.

To access the Teletext (All lines) option, press the **Teletext (All lines)** softkey in the VBI Menu. This option can be turned On or Off. When on, it enables extraction of Teletext System B (WST) data from lines 7 to 22 and 320 to 335 of the video input.

Teletext Data Out Option

This option indicates whether or not the Encoder is actually outputting Teletext data at that instant It is for status only and cannot be changed.

Teletext PID Option

> NOTE...
>
> This option is only available when Frame Rate is 25 Hz.

To access the Teletext PID option, press the **Teletext PID** softkey in the VBI Menu. This enables the Teletext PID to be changed.

VBI on PID Option

To access the VBI on PID option, press the **VBI on PID** softkey in the VBI Menu. This enables the VBI on a separate PID to be turned On or Off.

VBI PID Option

The VBI PID option is selected from the VBI Menu by pressing the **VBI PID** softkey. The option is used for entering or updating the VBI PID. Enter a PID using the softkeys then press the **Enter** softkey to accept it.

VBI In Picture Option

NOTES...

1. The **VBI in Picture** option is only accessible if the selected video profile/level is **422P@ML**[6].
2. **VBI in Picture** transmits the VBI waveform as part of the picture and as such will be subject to some distortion. Most analogue VBI types are robust against this type of distortion but others, e.g. video index and ITS, are intended for SDI transmission and will not survive MPEG coding/decoding in VBI in Picture mode.

To access the VBI in Picture option, press the **VBI in Picture** softkey in the `VBI Menu`. This enables the extended picture format available in the MPEG 4:2:2 specification to be selected. When selected, the Encoder compresses and transmits the VBI data as part of the active picture. This mode requires up to 3 Mbit/s of bit-rate, depending on the amount and complexity of the VBI present. It may be necessary to increase the video bit-rate accordingly to maintain picture quality.

NOTE...

When encoding VBI in this way **3:2 Pulldown** should be switched off. If it is not, then occasionally fields may not be encoded because of the inverse pulldown process. This results in some VBI lines not being transmitted.

When this option is not selected (or when 4:2:0 format video is used), VBI data must be transmitted in its original digital form either in an independent data stream (in the case of Teletext) or in user data fields within the MPEG video transport stream.

Table 4.41: VBI in Picture Options

Selected Option	Description
On	VBI is coded as active video.
Off	
Off (Bit-rate too low)	Insufficient bit-rate.

VPS (Line 16) Option

NOTE...

This option is only available when Frame Rate is 25 Hz.

To access the VPS (Line 16) option, press the **VPS (Line 16)** softkey in the `VBI Menu`. This enables the extraction of VPS (Video Programming System) data from line 16 of the video input. The option can be turned On or Off.

[6] 4:2:2 is only available when software option M2/ESO2/422 is purchased.

WSS (Line 23) Option

NOTES...

1. This option is only available when Frame Rate is 25 Hz.
2. Aspect ratio will change when WSS is enabled.

To access the WSS (Line 23) option, press the **WSS (Line 23)** softkey in the VBI Menu. This enables the extraction of WSS (Wide Screen Signalling) data from line 23 of the video input. The option can be turned On or Off.

Closed Caption Option

To access the Closed Caption option, press the **Closed Caption** softkey in the VBI Menu. This enables the extraction of closed captioning data from line 21 of the video input. The option can be turned On or Off.

CC Format Option

To access the CC Format option, press the **CC Format** softkey in the VBI Menu. This inserts the closed captions as user data in the video stream in the selected format.

NOTE...

This option is only displayed if the video frame rate is set to 29.97 Hz.

Table 4.42: CC Format Options

Selected Option	Description
TANDBERG / NDS	Closed Caption format.
ATSC	

Auto Detect VITC Option

To access the Auto Detect VITC option, press the **Auto Detect VITC** softkey in the VBI Menu. This enables the Vertical Interval Time Code (VITC) to be automatically detected. The option can be turned On or Off.

VBI Line ‘n’ Option

To access the VBI - Line ‘n’ option, press the **VBI - Line** ‘n’ softkey in the VBI Menu (the line number shown changes according to the line option selected). This enables extraction of VBI data from the selected line, and specifies the type of VBI data that the line contains.

NOTE...

To autodetect VITC the lines within the VBI line option must be set to VITC.

Table 4.43: VBI - Line 'n' Options

Option	Description
Frame Rate = 29.97 Hz	
Off	VBI data is not extracted from the line.
Vertical Interval Time Code	VITC data extracted from the line.
Video Index	
Closed Caption	The setting cannot be selected on this screen, but is set by setting the **Closed Caption** option to **On**. It indicates that closed captioning data is extracted from the line. Setting Line 21 back to **Off** or VITC resets the **Closed Caption** option back to **Off**.
Neilsen AMOL 1	Neilsen AMOL 1 data is extracted from the line.
Neilsen AMOL 11	Neilsen AMOL 11 data is extracted from the line.
Frame Rate = 25 Hz	
Off	VBI data is not extracted from the line.
Vertical Interval Time Code	VITC data extracted from the line.
Video Index	Aspect ratio will be affected (see *525 line* – with AFD set to On, lines 14 and 277 will be set to Video Index. Table 4.37).
Teletext System B (World System Teletext)	Teletext System B data extracted from the line.
Inverted Teletext	Inverted Teletext is extracted from the line.
Wide Screen Signalling	The setting cannot be selected on this screen, but is set by setting the WSS (**Line** 23) option to **On**. It indicates that WSS data is extracted from the line. Setting Line 23 back to **Off**, VITC or **Teletext System B** resets the WSS (**Line** 23) option back to **Off**.
Closed Caption	Closed Caption data is extracted from the line.
Video Programming System	The setting cannot be selected on this screen, but is set by setting the VPS (**Line** 16) option to **On**. It indicates that VPS data is extracted from the line. Setting Line 16 back to **Off**, VITC or **Teletext System B** resets the VPS (**Line** 16) option back to **Off**.

When operating in ATSC mode and Closed Captions, the language of the descriptors is set by the Encoder.

When switching the Encoder from DVB to ATSC mode the PIDs are remapped. The remapping would be specified by the program paradigm. Switching back to DVB would invoke the original PIDs.

Line Number (whole frame)	Line Number (field by field)	FIELD 1	Line Number (whole frame)	Line Number (field by field)	FIELD 2
			272	9	Same options as line 10
10		VITC (SMPTE), Video Index, Off, Closed Caption, Nielsen/AMOL 1, Nielsen/AMOL 11	273	10	Same options as line 10
11	11	Same options as line 10	274	11	Same options as line 10
12	12	Same options as line 10	275	12	Same options as line 10
13	13	Same options as line 10	276	13	Same options as line 10
14	14	Same options as line 10	277	14	Same options as line 10
15	15	Same options as line 10	278	15	Same options as line 10
16	16	Same options as line 10	279	16	Same options as line 10
17	17	Same options as line 10	280	17	Same options as line 10
18	18	Same options as line 10	281	18	Same options as line 10
19	19	Same options as line 10	282	19	Same options as line 10
20	20	Same options as line 10	283	20	Same options as line 10
21	21	Same options as line 10	284	21	Same options as line 10
22	22	Same options as line 10	285	22	Same options as line 10
23 - 262	23 - 262	ACTIVE VIDEO Start of coded video.	286 - 525	23 - 262	ACTIVE VIDEO Start of coded video.
263	263	ACTIVE VIDEO / Equalising pulses			

NOTES...

1. In 525-line systems, fields start on the first full line after the end of the picture period. Therefore, field 1 is 262 lines long and field 2 is 263 lines long.
2. An MPEG frame is 480 lines when formatting 525-line format pictures.
3. For compatibility with some older Receivers the start of coded video may need to begin at line 22. Contact Customer Services for details.

Figure 4.12: VBI Structure Implemented by TANDBERG for 525-line Systems

FIELD 1			FIELD 2		
7	Teletext System B or Inverted Teletext, VITC, Video Index, Closed Caption, Wide Screen Signalling (WSS), Off, Video Programming System (VPS)		319	Same options as line 7	
8	Same options as line 7		320	Same options as line 7	
9	Same options as line 7		321	Same options as line 7	
10	Same options as line 7		322	Same options as line 7	
11	Same options as line 7		323	Same options as line 7	
12	Same options as line 7		324	Same options as line 7	
13	Same options as line 7		325	Same options as line 7	
14	Same options as line 7		326	Same options as line 7	
15	Same options as line 7		327	Same options as line 7	
16	Same options as line 7		328	Same options as line 7	
17	Same options as line 7		329	Same options as line 7	
18	Same options as line 7		330	Same options as line 7	
19	Same options as line 7		331	Same options as line 7	
20	Same options as line 7		332	Same options as line 7	
21	Same options as line 7		333	Same options as line 7	
22	Same options as line 7		334	Same options as line 7	
23	Same options as line 7	Start of coded video.	335	Same options as line 7	
24	Same options as line 7	ACTIVE VIDEO	336	Same options as line 7	Start of coded video.
25 - 310	ACTIVE VIDEO		337 - 622	ACTIVE VIDEO	
311 - 312	Equalising Pulses		623	ACTIVE VIDEO / Equalising Pulses	
313	Equalising Pulses (part)		624 - 625	Equalising Pulses	

NOTES...

1. Any type of valid VBI can be on any line, even if it is not usually associated with that line.
2. 625-line fields start on the leading edge of the first vertical sync (broad) pulse. Therefore, the first half of line 313 is in field 1 and the second half is in field 2.
3. An MPEG frame is 576 lines when formatting 625-line format pictures.
4. Line 23 is the Wide Screen Signalling line. It carries information which defines the picture Aspect Ratio.
5. ETS 300 294 is the specification which describes WSS.
6. EN 300 472 is the specification associated with System B Teletext (World System Teletext).

Figure 4.13: VBI Structure Implemented by TANDBERG for 625-line Systems

4.9 Audio Menu

4.9.1 Overview

The Audio Menu is selected from the Setup Menu by pressing the **Audio** softkey. This menu permits the selection of audio parameters. Any option with a clear circle next to it cannot be accessed and changed. It is for status information only (see *Figure 4.15* for menu structure).

Although a full list of menu options are given, it depends upon the Coding Standard selected as to which are shown on the front panel display.

4.9.2 Audio A and B Menus

Introduction

Audio A and B have the same menu options, depending upon the Coding Standard selected. Audio A Menus are shown as examples. The Audio A Menu is selected from the Audio Menu by pressing the **Audio A** softkey.

This menu permits the selection of individual channel audio parameters.

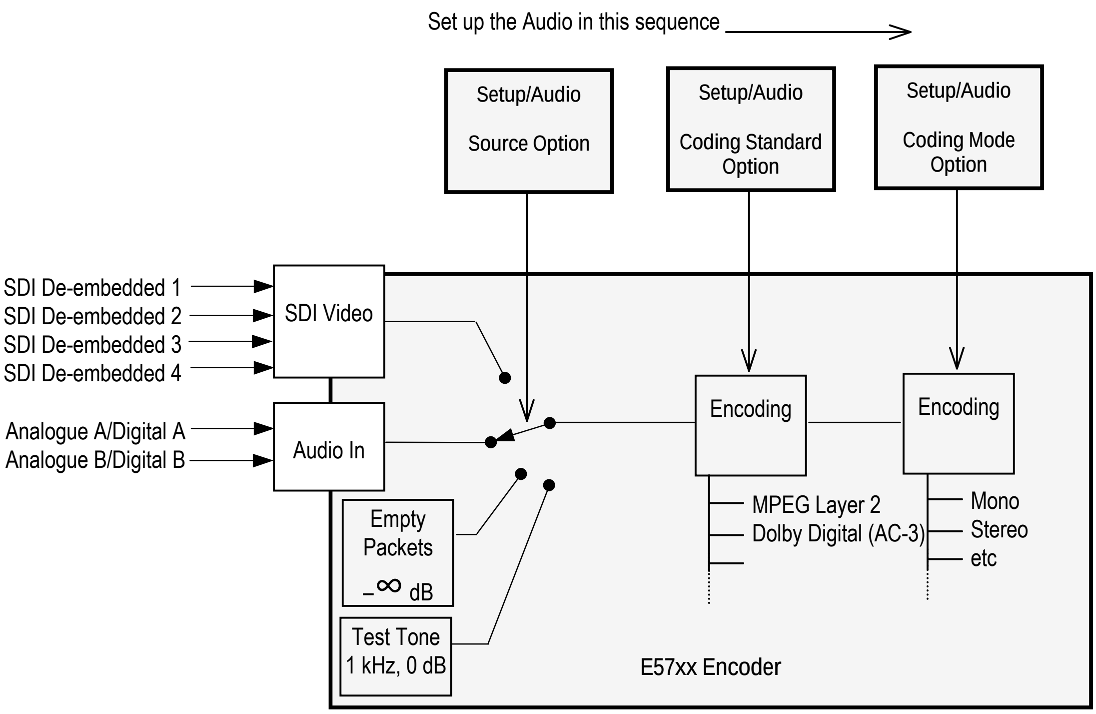


Figure 4.14: Setting up the Audio Input

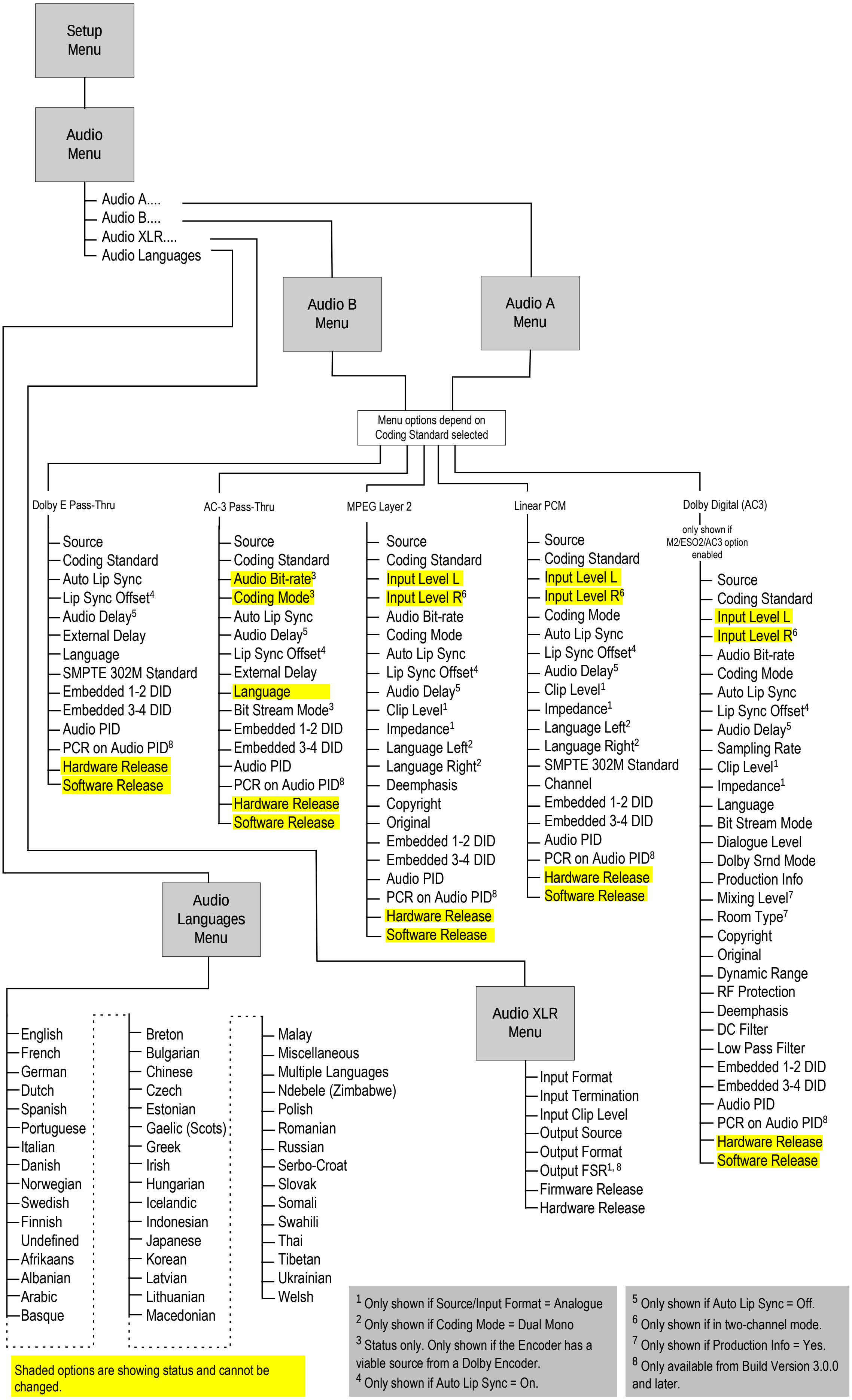


Figure 4.15: Menu Hierarchy – Setup/Audio Menu

Source Option

To access the Source option, press the **Source** softkey in the `Audio A Menu`.

Table 4.44: Source Options

Selected Option	Description	
Off	No audio packets are sent in the transport stream and audio is removed from the SI.	
Mute	Audio silence.	
Test Tone	The internal test tone is used as the audio source. Only possible for MPEG and Dolby Digital (AC-3). The bit-rate will automatically change to 96 kbit/s.	
Analogue	Analogue audio input on AUDIO IN connector.	
Digital	Digital audio input 1 on AUDIO IN connector.	
SDI Embedded 1	Digital audio de-embedded from digital video input using DID 0x2FF.	These are default DIDs
SDI Embedded 2	Digital audio de-embedded from digital video input using DID 0x2FF.	
SDI Embedded 3	Digital audio de-embedded from digital video input using DID 0x1FD.	
SDI Embedded 4	Digital audio de-embedded from digital video input using DID 0x1FD.	

Coding Standard Option

To access the Coding Standard option, press the **Coding Standard** softkey in the `Audio A Menu`.

Table 4.45: Coding Standard Options

Selected Option	Description
MPEG Layer 2	MPEG Layer 2 audio coding standard.
AC-3 Pass-Thru	Pre-encoded (in Dolby Encoder) AC-3 audio coding standard. See *Annex G, Audio Modes*, for information when using this mode.
Dolby E Pass-Thru	Dolby E audio coding standard (pre-encoded in Dolby Encoder). See *Annex G, Audio Modes*, for information when using this mode.
Dolby Digital (AC-3)	Dolby Digital (AC-3) audio coding standard.
Linear PCM	Linear PCM audio coding standard. See *Annex G, Audio Modes*, for information when using this mode.

Audio Bit-rate Option

NOTES...

1. This option is only shown when the Coding Standard is AC-3 Pass-Thru, MPEG Layer 2 or Dolby Digital (AC-3).
2. When AC-3 Pass-Thru is selected, Audio Bit-rate is status only.

To access the Audio Bit-rate option, press the **Audio Bit-rate** softkey in the `Audio A Menu`.

Table 4.46: Audio Bit-rate Options

Available Settings	MPEG Layer 2 Coding				Dolby Digital	
	Mono	Dual Mono	Stereo	Joint Stereo	1/0(C)	2/0(L,R)
32 kbit/s	✓	×	×	×	×	×
48 kbit/s	✓	×	×	×	×	×
56 kbit/s	✓	×	×	×	✓	×
64 kbit/s	✓	✓	✓	✓	✓	×
80 kbit/s	✓	×	×	×	✓	×
96 kbit/s	✓	✓	✓	✓	✓	✓
112 kbit/s	✓	✓	✓	✓	✓	✓
128 kbit/s	✓	✓	✓	✓	✓	✓
160 kbit/s	✓	✓	✓	✓	✓	✓
192 kbit/s	✓	✓	✓	✓	✓	✓
224 kbit/s	×	✓	✓	✓	✓	✓
256 kbit/s	×	✓	✓	✓	✓	✓
320 kbit/s	×	✓	✓	✓	✓	✓
384 kbit/s	×	✓	✓	✓	✓	✓
448 kbit/s	×	×	×	×	✓	✓
512 kbit/s	×	×	×	×	✓	✓
576 kbit/s	×	×	×	×	✓	✓
640 kbit/s	×	×	×	×	✓	✓

Input Level L Option

NOTE...

This option is only shown when the Coding Standard is MPEG Layer 2, Linear PCM or Dolby Digital (AC-3).

This option indicates the input level of the left audio channel. It is for status only and cannot be changed.

Input Level R Option

NOTE...

This option is not shown when the Coding Standard is MPEG Layer 2 (mono) or Dolby Digital (AC-3) (1/0).

This option indicates the input level of the right audio channel. It is for status only and cannot be changed.

Coding Mode Option

NOTE...

This option is only shown when the Coding Standard is MPEG Layer 2, Linear PCM or Dolby Digital (AC-3).

To access the Coding Mode option, press the **Coding Mode** softkey in the `Audio A Menu`. If the current audio bit-rate is outside the bit-rate range supported by the new coding mode, the bit-rate is changed automatically to the lowest value within the supported range.

Table 4.47: Coding Mode Options

Selected Option	Description	Coding Standard		
		MPEG Layer 2	Linear PCM	Dolby Digital (AC-3)
Mono	Single channel mono audio coding.	✓	✖	✖
Stereo	Dual channel stereo audio coding.	✓	✓	✖
Joint Stereo	Dual channel joint (intensity) stereo audio coding.	✓	✖	✖
Dual Mono	Dual channel mono audio coding.	✓	✓	✖
Audio Description		✓	✖	✖
1/0(C)	Single channel mono audio coding.	✖	✖	✓
2/0(L,R)	Dual channel stereo audio coding.	✖	✖	✓
3/0(L,C,R)	These modes are passed through the Encoder as part of the AC-3 Pass-through transport stream.	✖	✖	✖
2/1(L,R,S)		✖	✖	✖
3/1(L,C,R,S)		✖	✖	✖
2/2(L,R,Ls,Rs)		✖	✖	✖
3/2(L,C,R,Ls,Rs)		✖	✖	✖

NOTE...

Audio Description is only available if the input source is either digital or SDI embedded.

Auto Lip Sync Option

To access the Auto Lip Sync[7] option, press the **Auto Lip Sync** softkey in the `Audio A Menu` and select either On or Off. See the text underneath *Table 4.20* on *page 4-29* for use of this facility.

[7] To ensure correct lip sync when working with linear or pre-encoded audio, the option card M2/EOM2/AUDLIN should be used.

Lip Sync Offset Option

> NOTE...
> This option is only available if the Auto Lip Sync option is set to On.

To access the Lip Sync Offset option, press the **Lip Sync Offset** softkey in the `Audio A Menu`.

Table 4.48: Lip Sync Offset Options

Valid Input Range	Description
Min: 0 Max: 50	Lip Sync Offset in milliseconds.

Audio Delay Option

> NOTE...
> This option is only available if the Auto Lip Sync option is set to Off.

To access the Audio Delay option, press the **Audio Delay** softkey in the `Audio A Menu`.

Table 4.49: Audio Delay Options

Valid Input Range	Description
Min: 111 Max: 3540	Audio Delay in milliseconds.

External Delay Option

To access the External Delay option, press the **External Delay** softkey in the `Audio A Menu`. This parameter is used to compensate for external delays.

> NOTE...
> This option is only shown when the Coding Standard is Dolby E Pass-Thru or AC-3 Pass-Thru.

Table 4.50: External Delay Options

Valid Input Range	Description
Min: 0 ms Max: 450 ms	

Clip Level Option

To access the Clip Level option, press the **Clip Level** softkey in the `Audio A Menu`. This screen enables the audio clipping level to be set.

NOTES...

1. This option is only shown when the Coding Standard is MPEG Layer 2, Linear PCM or Dolby Digital (AC-3).
2. This option is only displayed when the audio source is analogue.
3. Clip Level refers to the head room above 0 dBu, prior to the audio being clipped.

Table 4.51: Clip Level Options

Selected Option	Description
12 dB	12 dB audio clipping level.
15 dB	15 dB is only available with PCB issue 4 and later.
18 dB	18 dB audio clipping level.

Impedance Option

To access the Impedance option, press the **Impedance** softkey in the `Audio A Menu`. This screen enables the impedance of the audio input to be set.

NOTES...

1. This option is only shown when the Coding Standard is MPEG Layer 2, Linear PCM or Dolby Digital (AC-3).
2. This option is only displayed when the audio source is analogue.

Table 4.52: Impedance Options

Selected Option	Description
600 ohms	Used in analogue mode.
20 kohms	

Language or Language Left/Right Option

To access the Language option, press the **Language** softkey in the `Audio A Menu`. This enables the language of the audio channel to be set.

To access the Language Left/Right option, press the **Language Left/Right** softkey in the `Audio A Menu`. This enables the language of the left and right audio channels to be set.

NOTE...

The Language Left/Right option is only shown when Coding Mode is set to Dual Mono.

SMPTE 302M Standard Option

NOTES...

1. This option is only shown when the Coding Standard is Linear PCM or Dolby E Pass-Thru.
2. Problems may be experienced with some Receivers if the Encoder and Decoder are not using the same version of SMPTE 302M specification, e.g. either 1998 or 2000. The Encoder can be set up to work in either standard.

To access the SMPTE 302M Standard option, press the **SMPTE 302M Standard** softkey in the `Audio A Menu`. This enables the SMPTE 302M standard that the audio is being encoded to to be specified. Use the **+** and **–** softkeys to scroll through the options and then press the **Enter** softkey after selecting one of them.

Table 4.53: SMPTE 302M Standard Options

Selected Option	Description
1998 Standard	Refers to the 1998 SMPTE 302M standard.
2000 Standard	Refers to the 2000 SMPTE 302M standard.

Channel Option

NOTE...

This option is only shown when the Coding Standard is Linear PCM or Dolby E Pass-Thru.

To access the Channel option, press the **Channel** softkey in the `Audio A Menu`. This indicates the number of the audio channel.

Table 4.54: Channel Options

Valid Input Range	Description
Min: 0 Max: 15	This value is written to the channel identification field in the (SMPTE 302M) AES3 data elementary stream header.

Bit Stream Mode Option

NOTE...

This option is only shown when the Coding Standard is Dolby Digital (AC-3).

To access the Bit Stream Mode option, press the **Bit Stream Mode** softkey in the `Audio A Menu`. This indicates the type of service the bit-stream conveys.

Table 4.55: Bit Stream Mode Options

Selected Option	Description
Complete Main	
Music & Effects	
Visually impaired	
Hearing impaired	
Dialogue	
Commentary	
Emergency	
Voice Over/Karaoke	In Dolby Digital when the coding mode is 1/0 this option appears as “Voice Over” otherwise as “Karaoke”.

Dialogue Level Option

> NOTE...
> This option is only shown when the Coding Standard is Dolby Digital (AC-3).

To access the Dialogue Level option, press the **Dialogue Level** softkey in the `Audio A Menu`. The value of the Dialogue Level affects the sound reproduction level and indicates how far the average dialogue level of the encoded program is below digital 100%.

Table 4.56: Dialogue Level Options

Selected Option	Description
–1 dB to –31 dB	Dialogue levels between –1 dB to –31 dB.

Dolby Srnd Mode Option

> NOTES...
> 1. This option is shown when the Coding Standard is Dolby Digital (AC-3) or Pass-Thru. However, because the data is not read from the incoming stream, ‘Not Indicated’ will always be displayed.
> 2. This parameter appears in the bit-stream only when operating in the two-channel mode (Audio Coding Mode = 2/0 L,R).

To access the Dolby Srnd Mode option, press the **Dolby Srnd Mode** softkey in the `Audio A Menu`. This indicates whether a two-channel Dolby Digital (AC-3) bit-stream is conveying a Dolby Surround encoded program.

Table 4.57: Dolby Srnd Mode Options

Selected Option	Description
Not indicated	It is not known if the bit-stream is conveying a Dolby Surround encoded program.
Not Dolby Surround	The bit-stream is not conveying a Dolby Surround encoded program.
Dolby Surround	The bit-stream is conveying a Dolby Surround encoded program.

Production Info Option

> NOTE...
> This option is only shown when the Coding Standard is Dolby Digital (AC-3).

To access the Production Info option, press the **Production Info** softkey in the `Audio A Menu`. This indicates whether the Mixing Level and Room Type parameters exist within the bit-stream. The options are On and Off.

Mixing Level Option

> NOTE...
> This option is only shown when the Coding Standard is Dolby Digital (AC-3) and the Production Info parameter is set to On.

To access the Mixing Level option, press the **Mixing Level** softkey in the `Audio A Menu`. This parameter indicates the acoustic sound pressure level of the dialog level during the final audio mixing session. This makes it possible for the programme to be replayed at the same loudness or at a known difference from the original.

This menu assumes a working knowledge of Dolby Digital encoding processes on the part of the user.

Table 4.58: Mixing Level Options

Selected Option	Description
0 dB to 31 dB	Mixing levels between 0 dB to 31 dB.

Room Type Option

> NOTE...
> This option is only shown when the Coding Standard is Dolby Digital (AC-3) and the Production Info parameter is set to On.

To access the Room Type option, press the **Room Type** softkey in the `Audio A Menu`. This parameter indicates the type and calibration of the mixing room used for the final audio mixing session.

Table 4.59: Room Type Options

Selected Option	Description
Not Indicated	
Small, Flat Mon	Type and calibration of the mixing room used for the final audio mixing session.
Large, X Curve Mon	

Copyright Option

> NOTE...
> This option is shown when the Coding Standard is Dolby Digital (AC-3) or MPEG Layer 2.

To access the Copyright option, press the **Copyright** softkey in the `Audio A Menu`. This indicates whether the information in the bit-stream is shown to be protected by copyright. This option can be turned On (protected) or Off (not protected).

Original Option

> NOTE...
> This option is shown when the Coding Standard is Dolby Digital (AC-3) or MPEG Layer 2.

To access the Original option, press the **Original** softkey in the `Audio A Menu`. This indicates whether the bit-stream is an original or a copy of an original bit-stream. This option can be turned On (an original) or Off (a copy of an original bit-stream).

Dynamic Range Option

> NOTE...
> This option is only shown when the Coding Standard is Dolby Digital (AC-3).

To access the Dynamic Range option, press the **Dynamic Range** softkey in the `Audio A Menu`. The dynamic range of audio material can vary according to its origin. This function determines which compression profile is applied to the encoding process.

The dynamic range compression profile determines the characteristic curve of the dynamic range compression algorithm (each profile has its own boost, null-band and cut parameters).

Table 4.60: Dynamic Range Options

Selected Option	Description
None/Custom	Program reproduction with the original dynamic range.
Film Standard	
Film Light	
Music Standard	
Music Light	
Speech	

RF Protection Option

> NOTE...
> This option is only shown when the Coding Standard is Dolby Digital (AC-3).

To access the RF Protection option, press the **RF Protection** softkey in the `Audio A Menu`. The option can be turned On (with RF Protection) or Off (without).

RF Overmodulation Protection is used in situations where the audio signal of a decoded AC-3 bit-stream is delivered via a link with very restricted dynamic range. One example is the case of a television broadcast, where sound is modulated onto an RF channel and delivered to a low cost television Receiver.

In this situation it is necessary to restrict the maximum peak output level to a known value with respect to dialogue level, in order to prevent overmodulation.

Deemphasis Option

> NOTE...
> This option is shown when the Coding Standard is Dolby Digital (AC-3) or MPEG Layer 2.

To access the Deemphasis option, press the **Deemphasis** softkey in the `Audio A Menu`. This parameter is used to de-emphasise the pre-emphasised audio.

To meet the specifications of the audio encoding algorithms (MPEG/AC-3), the audio input signal must not have any pre-emphasis applied. If the input signal does have pre-emphasis, a de-emphasis filtering process must be applied prior to encoding.

For a digital audio input, pre-emphasis detection is typically achieved by monitoring the pre-emphasis flags within the channel status data of the incoming digital audio signal. This is adjusted automatically by the Encoder when it is set to Auto.

For an analogue audio signal, the user must manually enable the appropriate de-emphasis filter accordingly.

The displayed options vary according to the audio Source and Coding standard.

The options for AC-3 are: **Off**, **Auto**, **On**. **Auto** applies to digital only.

The options for MPEG-1 are: **Off**, **50/15 µs**, **CCITT J17**.

DC Filter Option

> NOTE...
> This option is only shown when the Coding Standard is Dolby Digital (AC-3).

To access the DC Filter option, press the **DC Filter** softkey in the `Audio A Menu`. This parameter is used to activate a dc high-pass filter for all input channels. The option can be turned On or Off.

Low Pass Filter Option

> NOTE...
> This option is only shown when the Coding Standard is Dolby Digital (AC-3).

To access the Low Pass Filter option, press the **Low Pass Filter** softkey in the `Audio A Menu`. This parameter is used to activate a low-pass filter with a cut-off near the specified audio bandwidth that is applied to the main input channels. The option can be turned On or Off.

Embedded 1-2 DID Option

To access the Embedded 1-2 DID option, press the **Embedded 1-2 DID** softkey in the `Audio A Menu`. Refer to *Annex G, Audio Modes* for information about DIDs.

Table 4.61: Embedded 1-2 DID Options

Selected Option		Description
Min:	0	Off
Max:	1023	Select DID
Other:	>1023	Default DID

Embedded 3-4 DID Option

The Embedded 3-4 DID option is selected from the `Audio A Menu` by pressing the **Embedded 3-4 DID** softkey. The Embedded 3-4 DID option has the same choices as the Embedded 1-2 DID option.

Audio PID Option

The Audio PID option is selected from the `Audio A Menu` by pressing the **Audio PID** softkey. The option is used for entering or updating audio PIDs. Enter a PID using the softkeys, then press the **Enter** softkey to accept it.

To be DVB compliant, PIDs below 32 are reserved. Therefore PIDs 32 to 8191 are available for use. In the event of a clash, one of the PIDs will be changed by the Encoder's internal checking algorithm.

> NOTE...
> Although PIDs below 32 are reserved it is still possible to change them. However, in the event of a clash one of the PIDs will NOT be changed by the Encoder's internal checking algorithm.

Hardware Release Option

This option indicates the hardware release of the audio. It is for status only and cannot be changed.

Software Release Option

This option indicates the software release of the currently selected audio standard. It is for status only and cannot be changed.

4.9.3 Audio Languages Menu

The Audio Languages Menu is selected from the Audio Menu by pressing the **Audio Languages** softkey. This menu permits the selection of languages used in the MPEG broadcast.

English is the default language and cannot be changed. Those other languages which have an asterisk (*****) next to them are selected for use, those without an asterisk are not. To select/deselect a language press the softkey nearest to it. The asterisk is turned on and off. There are over forty languages to choose from.

4.9.4 Audio XLR Menus (3.0 and later)

Input Format Option

To access the Input Format option, press the **Input Format** softkey in the Audio XLR Menu.

Table 4.62: Input Format Options

Selected Option	Description
Analogue	Analogue (balanced).
Digital	AES/EBU (balanced).

Input Termination Option

To access the Input Termination option, press the **Input Termination** softkey in the Audio XLR Menu.

Table 4.63: Input Termination Options (When Analogue Input Selected)

Selected Option	Description
20 kΩ	20 kΩ termination.
600 Ω	600 Ω termination.

Input Clip Level Option

To access the Input Clip Level option, press the **Input Clip Level** softkey in the Audio XLR Menu.

Table 4.64: Input Clip Level Options (When Analogue Input Selected)

Selected Option	Description
15 dB	15 dB full scale range.
18 dB	18 dB full scale range.

Output Source Option

To access the Output Source option, press the **Output Source** softkey in the Audio XLR Menu.

Table 4.65: Output Source Options

Selected Option	Description
SDI Embedded (1-4)	Any of the SDI embedded audio feeds.
XLR Input (Monitor)	Output the audio which is input to the card.
Off	No output.

Output Format Option

To access the Output Format option, press the **Output Format** softkey in the Audio XLR Menu.

Table 4.66: Output Format Options

Selected Option	Description
Analogue	Analogue output balanced ≅ 10 Ω impedance.
Digital	AES/EBU (balanced).

Output FSR Option

To access the Output FSR (Full Scale Range) option, press the **Output FSR** softkey in the Audio XLR Menu.

Table 4.67: Output FSR Options (When Analogue Input Selected)

Selected Option	Description
15 dB	Analogue maximum output 15 dB.
18 dB	Analogue maximum output 18 dB.

Firmware Release Option

This option indicates the firmware release of the Audio XLR Card. It is for status only and cannot be changed.

Hardware Release Option

This option indicates the Hardware release of the Audio XLR Card. It is for status only and cannot be changed.

4.10 Data Menu

4.10.1 Introduction

The Data Menu is selected from the Setup Menu by pressing the **Data** softkey. This menu permits the selection of RS-232 asynchronous data and RS-422 synchronous data channel parameters. If M2/EOM2/DAT is fitted there are additional menus for RS-422 data and for RS-232 asynchronous data.

See *Figure 4.16* for the menu structure.

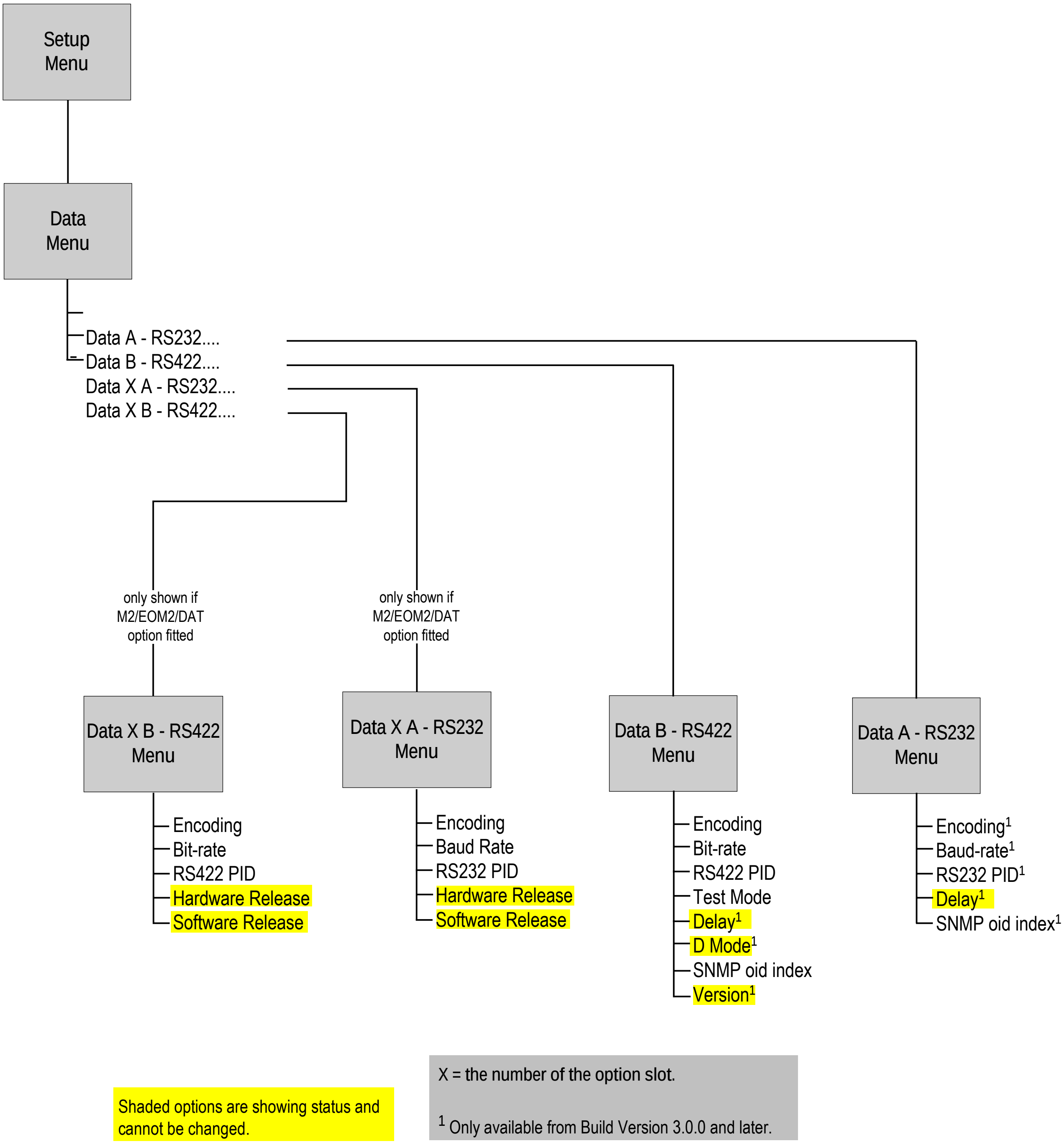


Figure 4.16: Menu Hierarchy – Setup/Data Menu

4.10.2 Data A - RS232 Menu (3.0 and later)

Encoding Option

To access the Encoding option, press the **Encoding** softkey in the `Data A - RS232 Menu`. This enables the RS-232 asynchronous data channel to be switched On or Off.

Baud Rate Option

To access the Baud Rate option, press the **Baud Rate** softkey in the `Data A - RS232 Menu`. This enables the baud rate of the RS-232 asynchronous data channel to be set.

Table 4.68: Baud Rate Options

Selected Option	Description	Selected Option	Description
1200	1200 Baud rate.	9600	9600 Baud rate.
2400	2400 Baud rate.	19200	19200 Baud rate.
4800	4800 Baud rate.	38400	38400 Baud rate.

RS232 PID Option

The RS232 PID option is selected from the `Data A - RS232 Menu` by pressing the **RS232 PID** softkey. The option is used for entering or updating data PIDs. Enter a PID using the softkeys, then press the **Enter** softkey to accept it.

To be DVB compliant, PIDs below 32 are reserved. Therefore PIDs 32 to 8191 are available for use. In the event of a clash, one of the PIDs will be changed by the Encoder's internal checking algorithm.

Delay Option

The Delay option is selected from the `Data A - RS232 Menu` by pressing the **Delay** softkey. The option cannot be changed.

SNMP oid index Option

The SNMP oid[8] index option is selected from the `Data A - RS232 Menu` by pressing the **SNMP oid index** softkey.

All option modules have the same SNMP oid with the exception of one byte which identifies which slot the module is in. An MEM expects the data module to be in slot two or three in the previous version of the Encoder. Therefore, slots one and two in this Encoder have been allocated to correspond directly to slots two and three in the previous Encoder.

In this Encoder the data module can be allocated to slot one, making it inaccessible to an MEM. This variable allows the on-board data module to be apparently moved around - to a slot in which it may be referenced by the MEM.

Table 4.69: SNMP oid index Options

Selected Option		Description
Min:	1	Oid index
Max:	7	

4.10.3 Data B - RS422 Menu

Encoding Option

To access the Encoding option, press the **Encoding** softkey in the `Data B - RS422 Menu`. This enables the RS-422 synchronous data channel to be switched On or Off.

[8] oid = object identifier.

Bit-rate Option

To access the Bit-rate option, press the **Bit-rate** softkey in the `Data B - RS422 Menu`. This enables the bit-rate of the RS-422 synchronous data channel to be set.

Table 4.70: Bit-rate Options

Selected Option	Description
Settings cycle from 56 to 1792 in steps of 56 then from 64 to 2048 in steps of 64, then back to 56	RS-422 synchronous data channel bit-rate.

RS422 PID Option

The RS422 PID option is selected from the `Data B - RS422 Menu` by pressing the **RS422 PID** softkey. The option is used for entering or updating data PIDs. Enter a PID using the softkeys, then press the **Enter** softkey to accept it

To be DVB compliant, PIDs below 32 are reserved. Therefore PIDs 32 to 8191 are available for use. In the event of a clash, one of the PIDs will be changed by the Encoder's internal checking algorithm.

Test Mode Option

The Test Mode option is selected from the `Data B - RS422 Menu` by pressing the **Test Mode** softkey. The option is used for turning the test mode On and Off.

Delay Option

The Delay option is selected from the `Data A - RS232 Menu` by pressing the **Delay** softkey. The option cannot be changed.

D Mode Option

The D Mode option is selected from the `Data A - RS232 Menu` by pressing the **D Mode** softkey. The option cannot be changed.

SNMP oid index Option

The SNMP oid[9] index option is selected from the `Data B - RS422 Menu` by pressing the **SNMP oid index** softkey. See *SNMP oid index Option* on *page 4-68* for details of this option.

Version Option

This option indicates the version of the data. It is for status only and cannot be changed.

[9] oid = object identifier.

4.10.4 Data XA - RS232 Menu (When M2/EOM2/DAT Fitted)

Overview

> NOTE...
> In the `Data XA - RS232 Menu,` X = the number of the option slot that the module fits into.

See *Section 4.10.2, Data A - RS232 Menu*, for the following options:

- Encoding
- Baud-rate
- RS232 PID

Hardware Release Option

This option indicates the hardware release of the data card. It is for status only and cannot be changed.

Software Release Option

This option indicates the software release of the data card. It is for status only and cannot be changed.

4.10.5 Data XB – RS422 Menu (M2/EOM2/DAT Fitted)

Overview

> NOTE...
> In the `Data XB – RS422 Menu,` X = the number of the option slot that the module fits into.

See *Section 4.10.3, Data B - RS422 Menu*, for the following options:

- Encoding
- Bit-rate
- RS422 PID

Hardware Release Option

This option indicates the hardware release of the data card. It is for status only and cannot be changed.

Software Release Option

This option indicates the software release of the data card. It is for status only and cannot be changed.

4.11 Output Menu

4.11.1 Overview

The `Output Menu` is selected from the `Setup Menu` by pressing the **Output** softkey. This menu permits the selection of the output parameters. See *Figure 4.17* for the menu structure.

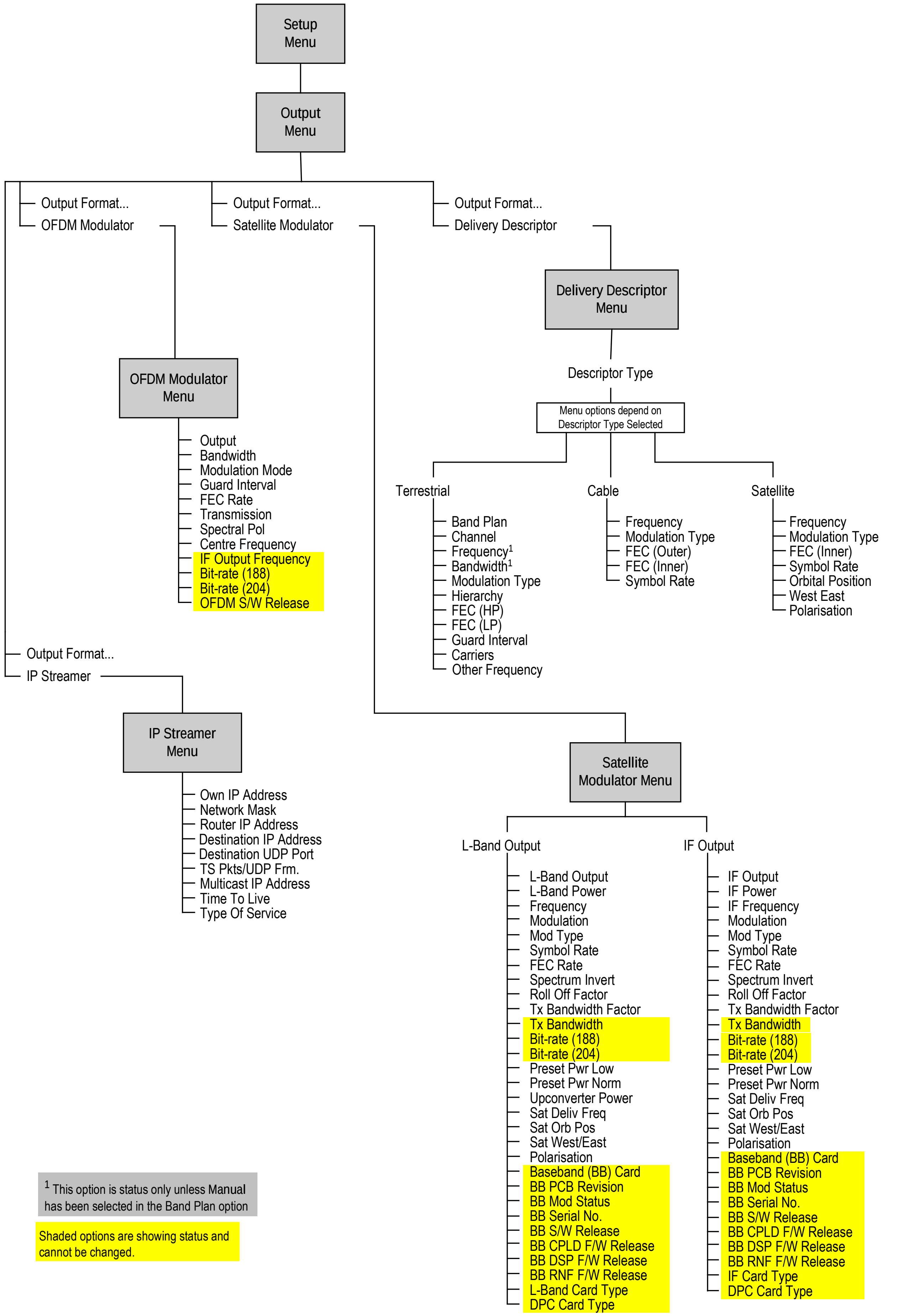


Figure 4.17: Menu Hierarchy – Setup/Output Menu

4.11.2 Output Format Option

To access the Output Format option, press the **Output Format** softkey in the `Output Menu`. The menus available depend upon which option cards are fitted to the unit.

If the Output Format option = ASI then the following menu option is **Delivery Descriptor**, otherwise it is the menu associated with the output format selected, i.e. satellite modulator, OFDM modulator or IP Output.

4.11.3 Delivery Descriptor Menu

To access the `Delivery Descriptor Menu`, press the **Delivery Descriptor** softkey in the `Output Menu`. The screens in this menu vary according to the **Descriptor Type** selected.

4.11.4 Descriptor Type Option

To access the Descriptor Type option, press the **Descriptor Type** softkey in the `Delivery Descriptor Menu`. This enables the descriptor type to be specified.

Table 4.71: Descriptor Type Options

Selected Option	Description	Comments
Satellite	Descriptor type set to Satellite.	The type of delivery descriptor selected affects the remaining options shown on the Delivery Descriptor Menu.
Terrestrial	Descriptor type set to Terrestrial.	
None		
Cable	Descriptor type set to Cable.	

4.11.5 Descriptor Type = Terrestrial

Band Plan Option

To access the Band Plan option, press the **Band Plan** softkey in the `Delivery Descriptor Menu`.

Once a country has been selected then the required channel should be selected in the Channel option. Each channel number corresponds to a particular frequency (see *Annex F, Band Plans*).

Table 4.72: Band Plan Options

Selected Option	Selected Option
Australia	Ireland
Europe VHF	South Africa
Europe CATV	French Overseas PIA
Italy	France
Morocco	Japan
New Zealand	USA
China	CCIR[10]
OIRT[11]	Manual

Channel Option

To access the Channel option, press the **Channel** softkey in the `Delivery Descriptor Menu`. Each channel number corresponds to a particular frequency (see *Annex F, Band Plans*).

Table 4.73: Channel Options

Valid Input Range	Description
Depends upon the country selected.	See *Annex F, Band Plans* for the frequencies associated with particular countries.

Frequency Option

To access the Frequency option, press the **Frequency** softkey in the `Delivery Descriptor Menu`. This enables the carrier frequency of the transmitter to be specified.

NOTES...

1. This option is not displayed if the unit is set to generate PSIP externally or it is under MEM control.
2. This option is status only unless Manual has been selected in the Band Plan option.

Table 4.74: Frequency Options

Selected Option	Description
Min: 0.0001 MHz Max: 42949.6729 MHz Step Size: 0.0001 MHz	Carrier frequency of transmitter.

Bandwidth Option

To access the Bandwidth option, press the **Bandwidth** softkey in the `Delivery Descriptor Menu`. This enables the channel spacing of the terrestrial transmitter to be specified.

[10] CCIR is now know as International Telecommunications Union-Radiocommunications Study Groups.
[11] Organisation that co-ordinated TV standards and programme interchange among the Eastern–block countries of Europe.

NOTE...
This option is status only unless **Manual** has been selected in the Band Plan option.

Table 4.75: Bandwidth Options

Selected Option	Description
6 MHz	Terrestrial transmitter channel spacing is 6 MHz.
7 MHz	Terrestrial transmitter channel spacing is 7 MHz.
8 MHz	Terrestrial transmitter channel spacing is 8 MHz.
10 MHz	Terrestrial transmitter channel spacing is 10 MHz.
12 MHz	Terrestrial transmitter channel spacing is 12 MHz.

Modulation Type Option

To access the Modulation Type option, press the **Modulation Type** softkey in the `Delivery Descriptor` Menu. This enables the type of modulation used to be specified.

Table 4.76: Modulation Type Options

Selected Option	Description
QPSK	Terrestrial transmitter uses QPSK modulation.
16-QAM	Terrestrial transmitter uses 16QAM modulation.
64-QAM	Terrestrial transmitter uses 64QAM modulation.

Hierarchy Option

To access the Hierarchy option, press the **Hierarchy** softkey in the `Delivery Descriptor` Menu. This screen enables the hierarchy of the terrestrial transmission to be specified.

Table 4.77: Hierarchy Options

Selected Option	Description
Non-Hierarchical	Terrestrial transmission is not hierarchical.
Alpha=1	Terrestrial transmission is hierarchical, and the α value = 1.
Alpha=2	Terrestrial transmission is hierarchical, and the α value = 2.
Alpha=4	Terrestrial transmission is hierarchical, and the α value = 4.

FEC (HP) and FEC (LP) Options

To access the FEC (HP) or the FEC (LP) option, press the **FEC (HP)** or **FEC (LP)** softkey in the `Delivery Descriptor Menu`. These screens enable the inner FEC schemes used by the terrestrial transmitter to be specified.

NOTE...
If the **Hierarchy** option is set to **Non-Hierarchical**, then only the **FEC Rate** parameter is used and shown on the display.

If the **Hierarchy** option is set to **Alpha=*n***, then the **FEC (HP)** and **FEC (LP)** parameters provide two levels of modulation. Transmission starts with the code rate for the HP level of modulation and ends with the code rate for the LP level.

The screen for the FEC (LP) option is the same except that **(LP)** replaces **(HP)**.

Table 4.78: FEC (HP) and FEC (LP) Options

Selected Option	Description
1/2	Terrestrial transmitter FEC rate HP/LP is 1/2.
2/3	Terrestrial transmitter FEC rate HP/LP is 2/3.
3/4	Terrestrial transmitter FEC rate HP/LP is 3/4.
5/6	Terrestrial transmitter FEC rate HP/LP is 5/6.
7/8	Terrestrial transmitter FEC rate HP/LP is 7/8.

Guard Interval Option

To access the Guard Interval option, press the **Guard Interval** softkey in the `Delivery Descriptor Menu`. This enables the guard interval of the terrestrial transmitter to be specified.

Table 4.79: Guard Interval Options

Selected Option	Description
1/4	Terrestrial transmitter guard interval is 1/4.
1/8	Terrestrial transmitter guard interval is 1/8.
1/16	Terrestrial transmitter guard interval is 1/16.
1/32	Terrestrial transmitter guard interval is 1/32.

Carriers Options

To access the Carriers option, press the **Carriers** softkey in the `Delivery Descriptor Menu`. This enables the transmission mode (i.e. number of carriers in an OFDM frame) used by the terrestrial transmitter to be specified.

Table 4.80: Carriers Options

Selected Option	Description
2k Mode	Terrestrial transmitter uses 2k transmission mode (2k carriers in an OFDM frame).
8k Mode	Terrestrial transmitter uses 8k transmission mode (8k carriers in an OFDM frame).

Other Frequency Option

To access the Other Frequency option, press the **Other Frequency** softkey in the `Delivery Descriptor Menu`. This enables the flag which specifies whether other frequencies are in use or not to be set.

Table 4.81: Other Frequency Options

Selected Option	Description
None	No other frequency is in use.
in use	One or more other frequencies are in use.

4.11.6 Descriptor Type = Cable

Frequency Option

See *Frequency Option* on *page 4-73*.

Modulation Type Option

To access the Modulation Type option, press the **Modulation Type** softkey in the `Delivery Descriptor` Menu. This screen enables the type of modulation used by the cable channel to be specified.

Table 4.82: Modulation Type Options

Selected Option	Description
16-QAM	Cable channel uses 16QAM modulation.
32-QAM	Cable channel uses 32QAM modulation.
64-QAM	Cable channel uses 64QAM modulation.
128-QAM	Cable channel uses 128QAM modulation.
256-QAM	Cable channel uses 256QAM modulation.

FEC (Outer) Option

To access the FEC (Outer) option, press the **FEC (Outer)** softkey in the `Delivery Descriptor` Menu. This screen enables the outer FEC rate used by the cable channel to be specified.

Table 4.83: FEC (Outer) Options

Selected Option	Description
No outer FEC coding	Cable channel does not use outer FEC.
RS(204/188)	

FEC (Inner) Option

To access the FEC (Inner) option, press the **FEC (Inner)** softkey in the `Delivery Descriptor` Menu. This screen enables the inner FEC rate used by the cable channel to be specified.

Table 4.84: FEC (Inner) Options

Selected Option	Description
No conv. coding	Cable channel does not use inner FEC rate.
1/2	Cable channel uses inner FEC rate of 1/2.
2/3	Cable channel uses inner FEC rate of 2/3.
3/4	Cable channel uses inner FEC rate of 3/4.
5/6	Cable channel uses inner FEC rate of 5/6.
7/8	Cable channel uses inner FEC rate of 7/8.
8/9	Cable channel uses inner FEC rate of 8/9.

Symbol Rate Option

To access the Symbol Rate option, press the **Symbol Rate** softkey in the `Delivery Descriptor` Menu.

Table 4.85: Symbol Rate Options

Valid Input Range	Description
Min: 0.4688 Msym/s Max: 30.0000 Msym/s Step Size: 0.0001 Msym/s	Symbol rate. Changing the symbol rate affects the automatic Tx bandwidth, video bit-rate and video resolution calculations.

4.11.7 Descriptor Type = Satellite

Frequency Option

See *Frequency Option* on *page 4-73*.

Modulation Type Option

To access the Modulation Type option, press the **Modulation Type** softkey in the `Delivery Descriptor` Menu. This enables the type of modulation used by the satellite transponder to be specified.

Table 4.86: Modulation Type Options

Selected Option	Description
8PSK	Satellite transponder uses 8PSK modulation.
16QAM	Satellite transponder uses 16QAM modulation.
BPSK	Satellite transponder uses BPSK modulation.
QPSK	Satellite transponder uses QPSK modulation.

FEC (Inner) Option

To access the FEC (Inner) option, press the **FEC (Inner)** softkey in the `Delivery Descriptor` Menu. This screen enables the inner FEC rate used by the satellite transponder to be specified. See *FEC (Inner) Option, page 4-76* for further details.

Symbol Rate

See *Symbol Rate Option* on *page 4-77*.

Orbital Position Option

To access the Orbital Position option, press the **Orbital Position** softkey in the `Delivery Descriptor Menu`.

This enables the orbital position of the satellite to be specified.

Table 4.87: Orbital Position Options

Valid Input Range	Description
Min: 0.0° Max: 360.0° Step Size: 0.1°	

If the specified orbital position is outside the valid input range, a confirmation screen is displayed which shows the maximum/minimum value allowed.

West East Option

To access the West East option, press the **West East** softkey in the `Delivery Descriptor Menu`.

This enables the satellite west/east flag to be specified to indicate whether the satellite position is in the western or eastern part of the orbit.

Table 4.88: West East Options

Selected Option	Description
West	Satellite position is in western part of the orbit.
East	Satellite position is in the eastern part of the orbit.

Polarisation Option

To access the Polarisation option, press the **Polarisation** softkey in the `Delivery Descriptor Menu`.

This enables the polarisation of the satellite transponder to be specified.

Table 4.89: Polarisation Options

Selected Option	Description
Linear - Horizontal	Satellite transponder uses linear horizontal polarisation.
Linear - Vertical	Satellite transponder uses linear vertical polarisation.
Circular - Left	Satellite transponder uses circular left polarisation.
Circular - Right	Satellite transponder uses circular right polarisation.

4.11.8 Output Format = Satellite Modulator (IF Output)

IF Output Option

To access the IF Output option, press the **IF Output** softkey in the `Satellite Modulator Menu`. This enables the IF output to be switched On or Off.

IF Power Option

To access the IF Power option, press the **IF Power** softkey in the `Satellite Modulator Menu`.

Table 4.90: IF Power Options

Valid Input Range	Description
Min: –20 dBm Max: 5 dBm	

IF Frequency Option

To access the IF Frequency option, press the **IF Frequency** softkey in the `Satellite Modulator Menu`. This setting allows the centre frequency of the IF output to be changed.

Table 4.91: IF Frequency Options

Valid Input Range	Description
1U Min: 50 MHz Max: 90 MHz	
2U Min: 50 MHz Max: 180 MHz	

Modulation Option

To access the Modulation option, press the **Modulation** softkey in the `Satellite Modulator Menu`. This enables the Modulation to be switched On or Off.

Mod Type Option

To access the Mod(ulation) Type option, press the **Mod Type** softkey in the `Satellite Modulator Menu`. This enables the type of modulation used by the Satellite Modulator to be specified.

Table 4.92: Modulation Type Options

Selected Option	Description
BPSK	Satellite modulator uses BPSK modulation.
QPSK	Satellite Modulator uses QPSK modulation.
8PSK	Satellite Modulator uses 8PSK modulation.
16QAM	Satellite Modulator uses 16QAM modulation.

> NOTE...
>
> BPSK, 8PSK and 16QAM are only available in the 2U Encoder. The following software options must be purchased to enable the different modulation types; M2/ESO2/LSYM for BPSK, M2/ESO2/SM38PSK for 8PSK, M2/ESO2/SM316QAM for 16QAM.

Symbol Rate Option

To access the Symbol Rate option, press the **Symbol Rate** softkey in the `Satellite Modulator Menu`.

Table 4.93: Symbol Rate Options

Valid Input Range		Description
1U Min: Max: Step Size:	 0.4688 Msym/s 30.0000 Msym/s 0.0001 Msym/s	When the IF frequency is 60 MHz to 80 MHz the maximum symbol rate is 30 Msym/s. When the IF frequency is 50 MHz or 90 MHz the maximum symbol rate is 20 Msym/s.
2U Min (Low Sym Rate): Min: Max: Step Size:	 0.3000 Msym/s 1.0000 Msym/s 30.0000 Msym/s 0.0001 Msym/s	Minimum with low symbol rate option M2/ES02/LSYM. Changing the symbol rate affects the automatic Tx bandwidth, video bit-rate and video resolution calculations.

FEC Rate Option

To access the FEC Rate option, press the **FEC Rate** softkey in the `Satellite Modulator Menu`.

Table 4.94: FEC Rate Options

Selected Option	Description
1/2	Satellite Modulator uses FEC rate of 1/2.
2/3	Satellite Modulator uses FEC rate of 2/3.
3/4	Satellite Modulator uses FEC rate of 3/4.
5/6	Satellite Modulator uses FEC rate of 5/6.
7/8	Satellite Modulator uses FEC rate of 7/8.
8/9	Satellite Modulator uses FEC rate of 8/9.

NOTE...
Only certain combinations of Modulation Type and FEC Rate are valid.

Spectrum Invert Option

To access the Spectrum Invert option, press the **Spectrum Invert** softkey in the `Satellite Modulator Menu`. This allows the spectrum inversion to be turned On or Off.

Roll Off Factor Option

The Roll Off Factor option is to do with the bandwidth of the modulated output and how quickly the output level rolls off with frequency. There are two values, 25% and 35%. Only 35% is allowed for QPSK but both 25% and 35% are available in 8PSK and 16QAM.

Tx Bandwidth Factor Option

To access the Tx Bandwidth Factor option, press the **Tx Bandwidth Factor** softkey in the `Satellite Modulator Menu`. This option is used to calculate the Tx Bandwidth based upon the Symbol Rate.

Bandwidth = Factor x Symbol Rate

Table 4.95: Tx Bandwidth Factor Options

Valid Input Range	Description
Min: 1 Max: 2 Step Size: 0.01	

Tx Bandwidth Option

The Tx Bandwidth option value cannot be updated. It should only be used as an approximate value as it depends on the performance of external equipment as well.

Bit-rate (188) Option

The Bit-rate (188) option value cannot be updated.

Bit-rate (204) Option

The Bit-rate (204) option value cannot be updated.

Preset Pwr Low Option

To access the Preset Pwr Low option, press the **Preset Pwr Low** softkey in the `Satellite Modulator Menu`.

Table 4.96: Preset Pwr Low Options

Valid Input Range	Description
Min: -20.0 dBm Max: 0.0 dBm Step Size: 0.1 dBm	

Preset Pwr Norm Option

To access the Preset Pwr Norm option, press the **Preset Pwr Norm** softkey in the `Satellite Modulator Menu`.

Table 4.97: Preset Pwr Norm Options

Valid Input Range	Description
Min: -20.0 dBm Max: 5.0 dBm Step Size: 0.1 dBm	

Sat Deliv Freq Option

To access the Sat Deliv Freq option, press the **Sat Deliv Freq** softkey in the `Satellite Modulator Menu`.

Table 4.98: Sat Deliv Freq Options

Valid Input Range	Description
Min: 0.0000 GHz Max: 999.9999 GHz Step Size: 0.0001 GHz	

Sat Orb Pos Option

To access the Sat Orb Pos option, press the **Sat Orb Pos** softkey in the `Satellite Modulator Menu`. This enables the orbital position of the satellite to be specified.

Table 4.99: Sat Orb Pos Options

Valid Input Range	Description
Min: 0.0° Max: 360.0° Step Size: 0.1°	

If the specified orbital position is outside the valid input range, a confirmation screen is displayed which shows the maximum/minimum value allowed.

Sat West/East Option

To access the Sat West/East option, press the **Sat West/East** softkey in the `Satellite Modulator Menu`.

This enables the satellite west/east flag to be specified, indicating whether the satellite position is in the western or eastern part of the orbit.

Table 4.100: Sat West/East Options

Selected Option	Description
West	Satellite position is in western part of the orbit.
East	Satellite position is in the eastern part of the orbit.

Polarisation Option

To access the Polarisation option, press the **Polarisation** softkey in the `Satellite Modulator Menu`.

This enables the polarisation of the satellite transponder to be specified.

Table 4.101: Polarisation Options

Selected Option	Description
Linear - Horizontal	Satellite transponder uses linear horizontal polarisation.
Linear - Vertical	Satellite transponder uses linear vertical polarisation.
Circular - Left	Satellite transponder uses circular left polarisation.
Circular - Right	Satellite transponder uses circular right polarisation.

Status Only Options for the Satellite Modulator Menu

The following options are status only and cannot be changed. They give information about the Baseband (BB) Card.

- Baseband (BB) Card Option
- BB PCB Revision Option
- BB Mod Status Option
- BB Serial No. Option
- BB S/W Release Option
- BB CPLD F/W Release Option
- BB DSP F/W Release Option
- BB RNF F/W Release Option
- IF Card Type Option
- DPC Card Type Option

4.11.9 Output Format = Satellite Modulator (L-Band Output) (3.1 and later)

L-Band Output Option

To access the L-Band Output option, press the **L-Band Output** softkey in the `Satellite Modulator Menu`. This enables the L-Band output to be switched On or Off.

L-Band Power Option

To access the L-Band Power option press the **L-Band Power** softkey in the `Satellite Modulator Menu`.

Table 4.102: L-Band Power Options

Valid Input Range	Description
Min: -20.0 dBm Max: +5.0 dBm	

Frequency Option

To access the Frequency option press the **Frequency** softkey in the `Satellite Modulator Menu`.

Table 4.103: Frequency Options

Valid Input Range		Description
Min:	950 MHz	
Max:	1750 MHz	

Modulation Option

To access the Modulation option, press the **Modulation** softkey in the `Satellite Modulator Menu`. This enable the modulation to be switched On or Off.

Mod Type Option

Refer to *Mod Type Option* on *page 4-79* for details.

Symbol Rate Option

Refer to *Symbol Rate Option* on *page 4-80* for details. Exactly the same except that *Table 4.93* should only contain 2U values because L-Band output is only available in the 2U.

FEC Rate Option

Refer to *FEC Rate Option* on *page 4-80* for details.

Spectrum Invert Option

Refer to *Spectrum Invert Option* on *page 4-80* for details.

Roll Off Factor Option

Refer to *Roll Off Factor Option* on *page 4-80* for details.

Tx Bandwidth Factor Option

Refer to Tx Bandwidth Factor Option on page for details.

Tx Bandwidth Option

The Tx Bandwidth option value cannot be updated. It should only be used as an approximate value as it depends on the performance of external equipment as well.

Bit-rate (188) Option

The Bit-rate (188) option value cannot be updated.

Bit-rate (204) Option

The Bit-rate (204) option value cannot be updated.

Preset Pwr Low Option

Refer to *Preset Pwr Low Option* on *page 4-81* for details.

Preset Pwr Norm Option

Refer to *Preset Pwr Norm Option* on *page 4-81* for details.

Upconverter Power

To access the Upconverter Power option, press the **Upconverter Power** softkey in the `Satellite Modulator Menu`. This option allows the +24 Vdc power on the L-Band Modulator Main output to be either Enabled or Disabled.

> NOTE...
>
> The modulator provides dc power to drive an upconverter. Do not connect equipment to the main output which might be damaged by dc power without protecting with a suitable dc block.

Sat Deliv Freq Option

Refer to *Sat Deliv Freq Option* on *page 4-82* for details.

Sat Orb Pos Option

Refer to *Sat Orb Pos Option* on *page 4-82* for details.

Sat West/East Option

Refer to *Sat West/East Option* on *page 4-82* for details.

Polarisation Option

Refer to *Polarisation Option* on *page 4-83* for details.

Status Only Options for the Satellite Modulator Menu

The following options are for status only and cannot be changed.

- Baseband (BB) Card Option
- BB PCB Revision Option
- BB Mod Status Option
- BB Serial No. Option
- BB S/W Release Option
- BB CPLD F/W Release Option
- BB DSP F/W Release Option
- BB RNF F/W Release Option
- L-Band Output Card Type Option
- DPC Card Type Option

4.11.10 Output Format = OFDM Modulator (3.1 and later)

Output Option

To access the Output option, press the **Output** softkey in the `OFDM Modulator Menu`. This enables the modulator outputs to be switched On or Off.

Bandwidth Option

To access the Bandwidth option, press the **Bandwidth** softkey in the `OFDM Modulator Menu`.

Table 4.104: Bandwidth Options

Selected Option	Description
6 MHz	6 MHz transmission bandwidth
7 MHz	7 MHz transmission bandwidth
8 MHz	8 MHz transmission bandwidth

Modulation Mode Option

To access the Modulation Mode option, press the **Modulation Mode** softkey in the `OFDM Modulator Menu`.

Table 4.105: Modulation Mode Options

Selected Option	Description
QPSK	OFDM Modulator uses QPSK modulation
16QAM	OFDM Modulator uses 16QAM modulation
64QAM	OFDM Modulator uses 64QAM modulation

Guard Interval Option

To access the Guard Interval option, press the **Guard Interval** softkey in the `OFDM Modulator Menu`.

Table 4.106: Guard Interval Options

Selected Option	Description
1/32	OFDM Modulator uses 1/32 Guard Interval
1/16	OFDM Modulator uses 1/16 Guard Interval
1/8	OFDM Modulator uses 1/8 Guard Interval
1/4	OFDM Modulator uses 1/4 Guard Interval

FEC Rate Option

To access the FEC Rate option, press the **FEC Rate** softkey in the `OFDM Modulator Menu`.

Table 4.107: FEC Rate Options

Selected Option	Description
1/2	OFDM Modulator uses 1/2 FEC Rate
2/3	OFDM Modulator uses 2/3 FEC Rate
3/4	OFDM Modulator uses 3/4 FEC Rate
5/6	OFDM Modulator uses 5/6 FEC Rate
7/8	OFDM Modulator uses 7/8 FEC Rate

Transmission Option

To access the Transmission option, press the **Transmission** softkey in the `OFDM Modulator Menu`.

Table 4.108: Transmission Options

Selected Option	Description
2k Mode	OFDM Modulator uses 2k carriers
8k Mode	OFDM Modulator uses 8k carriers

Spectral Pol Option

To access the Spectral Pol option, press the **Spectral Pol** softkey in the `OFDM Modulator Menu`.

Table 4.109: Spectral Polarity Options

Selected Option	Description
High Side IF	The spectrum is inverted, thus allowing a subsequent upconverter LO to be on the high side of the spectrum.
Low Side IF	The spectrum is not inverted, thus allowing a subsequent upconverter LO to be on the low side of the spectrum.

Centre Frequency Option

To access the Centre Frequency option press the **Centre Frequency** softkey in the `OFDM Modulator Menu`. This is the centre frequency to be put in the SI of the output transport stream.

Table 4.110: Centre Frequency Options

Valid Input Range	Description
Min: 0 MHz	
Max: 4294.967295 MHz	

IF Output Frequency

The IF output frequency is fixed at 70 MHz.

Bit-rate (188)

The Bit-rate (188) option value cannot be updated.

Bit-rate (204)

The Bit-rate (204) option value cannot be updated.

OFDM S/W Release

The OFDM S/W Release value cannot be updated. It is the version of the software and firmware loaded on the OFDM modulator.

4.11.11 Output Format = IP Streamer (3.1 and later)

Own IP Address Option

To access the Own IP Address option, press the **Own IP Address** softkey in the `IP Streamer Menu`.

This is the local IP address associated with the 100 Mbit/s Ethernet video output interface.

Network Mask Option

To access the Network Mask option, press the **Network Mask** softkey in the `IP Streamer Menu`.

This is the network mask setting corresponding to the Own IP address.

Router IP Address Option

To access the Router IP Address option, press the **Router IP Address** softkey in the `IP Streamer Menu`.

If the Destination IP Address setting indicates an IP address not residing on the local net segment, the video traffic is forwarded to this gateway.

Destination IP Address Option

To access the Destination IP Address option, press the **Destination IP Address** softkey in the `IP Streamer Menu`.

This is the IP address to which the video stream should be sent. It can either be a unicast IP address or it can be a class D multicast address (224.0.0.1-239.255.255.255). Choosing a multicast IP address enables IGMPv2 support. Configuring a normal IP address turns off the IGMPv2 support again.

In some cases when running multicast traffic, you may want to forward the IP frames to a multicast relay agent. Configuring a unicast IP address here ensures that the IP Output card forwards the outgoing IP multicast packets to the MAC address corresponding to the chosen IP address.

If the address 172.21.207.1 is put here, the module would resolve the MAC address corresponding to this IP address instead of using the static multicast MAC address mapping specified in RFC1112 (the 23 bits etc). To turn off this feature again, type in 0.0.0.0

Destination UDP Port Option

To access the Destination UDP Port option, press the **Destination UDP Port** softkey in the `IP Streamer Menu`. This configures the UDP destination port field in the outgoing UDP frames.

TS Pkts/UDP Frm Option

To access the TS Pkts/UDP Frm (TS Packets/UDP Frame) option, press the **TS Pkts/UDP Frm** softkey in the `IP Streamer Menu`.

This configures how many 188-byte MPEG-2 Transport Stream packets are mapped into each UDP frame. Valid values are between 1 and 7. For bit-rates in excess of 15 Mbit/s it is recommended to use the maximum setting of 7.

Multicast IP Address Option

This option is not used.

Time To Live Option

To access the Time To Live option, press the **Time To Live** softkey in the `IP Streamer Menu`.

This is the Time-to-Live setting as specified in RFC-791. The Time-to-Live setting is decremented by one for each Router hop the IP frame does. When 0 (zero) is reached, the packet is discarded by the network. A value greater than one is recommended.

Type of Service Option

To access the Type of Service option, press the **Type of Service** softkey in the `IP Streamer Menu`.

This parameter is the byte value of the Type-of-Service (TOS) field in the IP header as specified in RFC-791. It is used for Class-of-service prioritisation. It depends on the Router honouring this field. This is normally set to one.

4.12 Mux Menu

4.12.1 Overview

The `Mux Menu` is selected from the `Setup Menu` by pressing the **Mux** softkey.

This menu permits the selection of Multiplexer output parameters, Remux (if enabled), RAS scrambling options (if enabled) and BISS scrambling options (if enabled). See *Figure 4.18* for details when **Syntax = DVB**. See *Figure 4.19* for details when **Syntax = ATSC**.

4.12.2 Mux Output, no Remux Card

To obtain various outputs when no Remux card is fitted:

- Basic mux output, no scrambling and no Remux – see *Section 4.12.4, Packet Length Option* to *Section 4.12.12, BISS Firmware*.
- RAS scrambling – see basic mux output + *Section 4.12.13, RAS Options Enabled*
- BISS scrambling – see basic mux output + *Section 4.12.14, BISS Options Enabled*

4.12.3 Mux Output, With Remux Card

To obtain an output when a Remux card is fitted, set the options in the following menus:

- *Host Bit-rate Option* on *page 4-97*
- Remux Module menu – see *Section 4.13.3, Remux Module Menu*
- Host and Incoming Services – *Section 4.13.4, 1.Service/2.Service Menu*

4.12.4 Packet Length Option

> NOTE...
> If the Satellite Modulator is set to On in the Output Menu then the Packet Length option is for status only and cannot be changed.

To access the Packet Length option, press the **Packet Length** softkey in the `Mux Menu`.

Table 4.111: Packet Length Options

Selected Option	Description
188 bytes	Uses 188 byte packet format.
204 bytes	Uses 204 byte packet format.

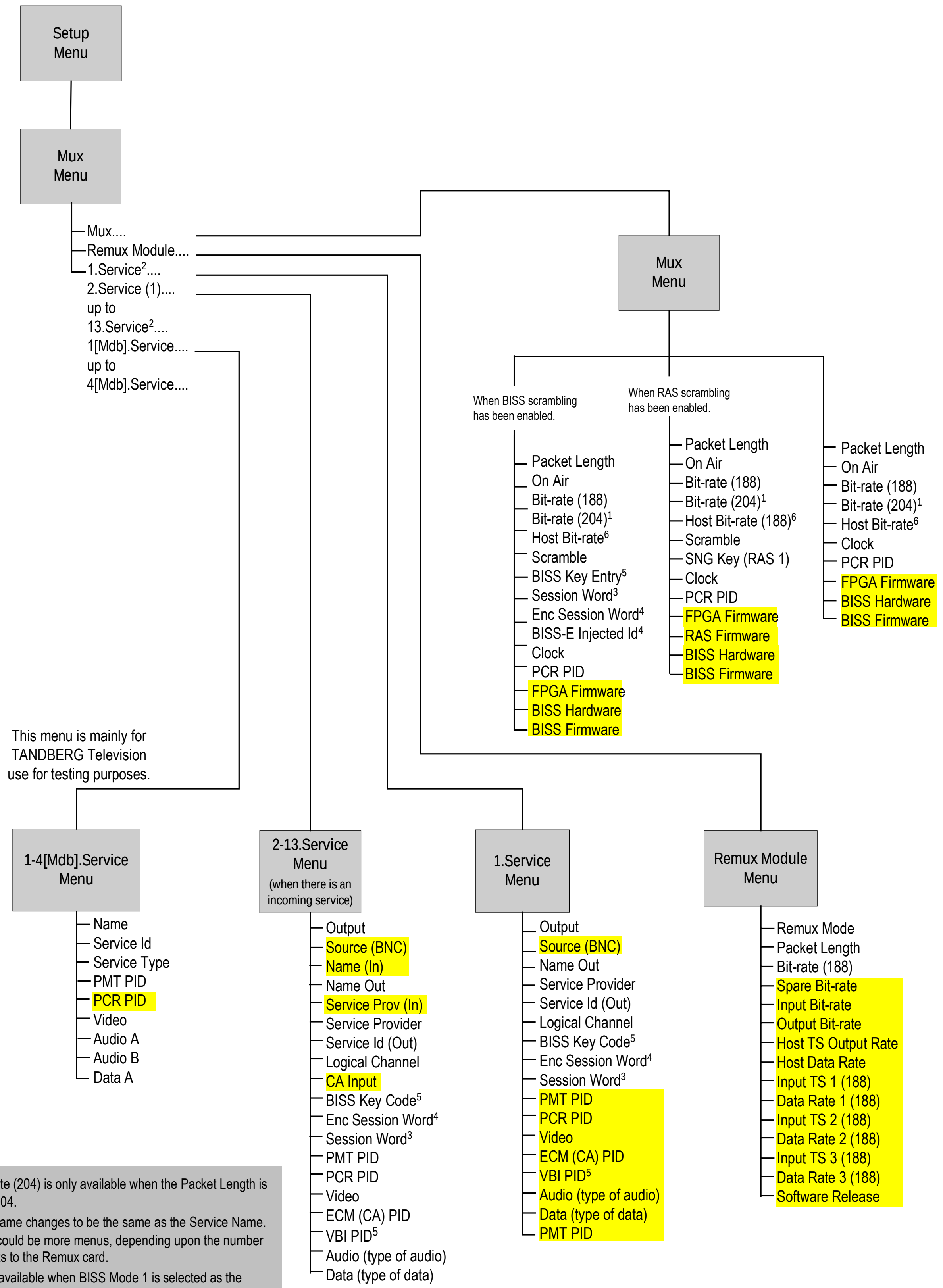
4.12.5 On Air Option

> NOTE...
> If the Satellite Modulator is set to On in the Output Menu then the On Air option is for status only and cannot be changed.

To access the On Air option, press the **On Air** softkey in the `Mux Menu`. This option can be On or Off, determining whether the output of the Encoder is sent to the Multiplexer.

Table 4.112: On Air Options

Selected Option	Description
On	Multiplexer output is switched on.
Off	Multiplexer output is switched off.



[1]Bit-Rate (204) is only available when the Packet Length is set to 204.
[2]This name changes to be the same as the Service Name. There could be more menus, depending upon the number of inputs to the Remux card.
[3] Only available when BISS Mode 1 is selected as the Scrambling mode. Available in Build version 2.2 and later.
[4] Only available when BISS-E is selected as the Scrambling mode. Available in Build version 2.2 and later.
[5] This option is not available from Build version 2.2.
[6] Only available when the Remux card is fitted and enabled.

Shaded options are showing status and cannot be changed.

Figure 4.18: Menu Hierarchy – Setup/Mux Menu (DVB)

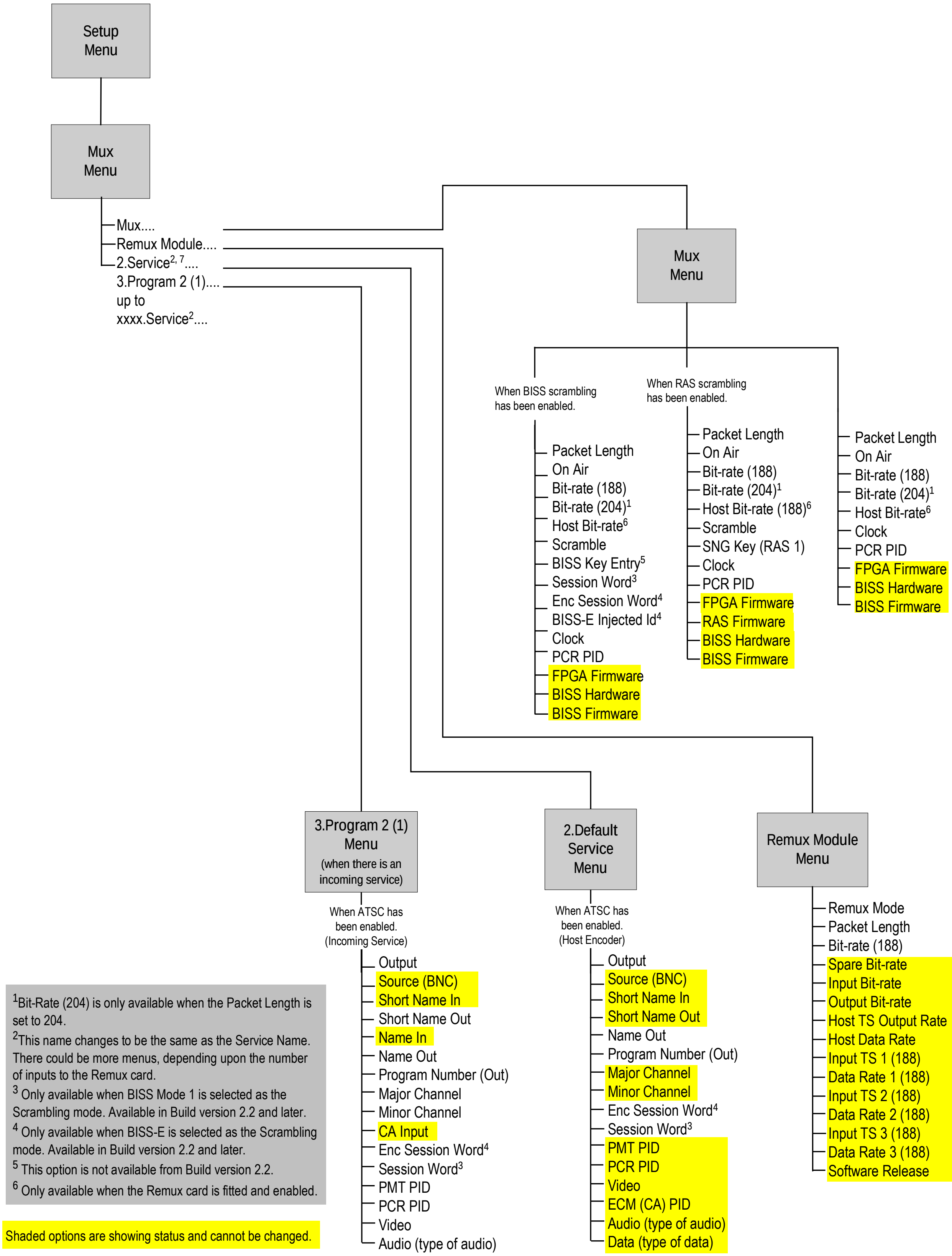


Figure 4.19: Menu Hierarchy – Setup/Mux Menu (ATSC)

4.12.6 Bit-rate (188) and Bit-rate (204) Option

> NOTE...
>
> If the Packet Length option is set to 188 bytes then only the Bit-rate (188) option is displayed. If the Packet Length option is set to 204 bytes then both the Bit-rate (188) and Bit-rate (204) options are displayed.

To access the either of the bit-rates, press the **Bit-rate (188**) or the **Bit-rate (204**) softkey in the `Mux Menu`.

Both the Bit-rate (188) and the Bit-rate (204) can be in the range of 0 Mbit/s to 50 Mbit/s.

Table 4.113: Bit-rate (188) and Bit-rate (204) Options

Selected Option	Description
188 / 204 Min: 0.0000 Mbit/s Max (without Remux):110.0000 Mbit/s Max (with Remux): 50.0000 Mbit/s Step Size: 0.0001 Mbit/s	Multiplexer output bit-rate when in baseband output format and ASI output mode. Changing the bit-rate affects the automatic video bit-rate and video resolution calculations.

If the specified bit-rate is outside the valid input range, a confirmation screen is displayed which shows the maximum/minimum value allowed.

4.12.7 Clock

> NOTE...
>
> This option indicates the origin of the clock. Prior to Build Version 3.0.0 it was set to Local Oscillator and could not be changed. After Build Version 3.0.0 it must be set to a video or external source before attempting to change the clock value or it will default to Local Oscillator.

To access the Clock option, press the **Clock** softkey in the `Mux Menu`.

Table 4.114: Clock Options

Selected Option	Description
Local Oscillator	The system clock is derived from the local oscillator.
HSYNC (External)	The system clock is locked to the HSYNC input.
Video	The system clock is locked to the video source.

4.12.8 PCR PID Option

To access the PCR PID option, press the **PCR PID** softkey in the `Mux Menu`. This shows the Program Clock Reference Packet Identifier.

Table 4.115: PCR PID Options

Selected Option	Description
Min: 1 Max: 8190 (1FFEh) Step Size: 1	

4.12.9 FPGA Firmware

This option indicates the version of the FPGA Firmware. It is for status only and cannot be changed.

4.12.10 RAS Firmware

This option indicates the version of the RAS Firmware. It is for status only and cannot be changed.

4.12.11 BISS[12] Hardware

This option indicates the version of the BISS Hardware. It is for status only and cannot be changed.

4.12.12 BISS Firmware

This option indicates the version of the BISS Firmware. It is for status only and cannot be changed.

4.12.13 RAS Options Enabled

Scramble Option

To access the Scramble option, press the **Scramble** softkey in the `Mux Menu`. This enables RAS1 security scrambling of the Encoder transmission to be switched on or off.

Table 4.116: Scramble Options (RAS)

Selected Option	Description
Off	Encoder output is not scrambled.
RAS (Fixed 1)	Encoder output is scrambled using the fixed RAS key assigned by TANDBERG TV, and preprogrammed into the Encoder.
RAS (Fixed 2)	Encoder output is scrambled using the fixed second RAS key assigned by TANDBERG TV, and preprogrammed into the Encoder.
RAS (EBU Key)	Encoder output is scrambled using the fixed RAS key assigned to the EBU and preprogrammed into the Encoder.
RAS1 (SNG Key)	Encoder output is scrambled. Scrambling key used is entered using the SNG Key (RAS1) option.

> NOTE...
>
> RAS Fixed Keys and the EBU Key are only programmed into the Encoder if requested when the units are ordered.

SNG Key (RAS1) Option

To access the SNG Key (RAS1) option, press the **SNG Key (RAS1)** softkey in the `Mux Menu`. This enables the scrambling key used in SNG Key scrambling mode to be set (see the Scramble option). The same scrambling code must be used at the receive end to unscramble the transmission.

[12] BISS is implemented according to EBU Tech 3292 May 2002.

Enter up to seven digits using the keypad, then press the **Enter** softkey to accept the scrambling code. If less then seven digits are entered, they are prefixed with 0’s (zero) to give a seven digit code.

4.12.14 BISS Options Enabled

Overview

BISS Mode 1 uses a fixed scrambling key, known as the Session Word, to encrypt the transport stream. The same Session Word must be entered in the Receivers and the Encoder to enable the transport stream to be decrypted.

BISS-E adds an extra layer of security, as a unique key is required for each Encoder and Receiver. This is known as the Encrypted Session Word. Each Encoder and Receiver is assigned a unique BISS Injected ID, which should not be made generally known, and which cannot be read from the unit.

For a particular transmission a BISS Session Word is chosen, and then encrypted, using each unit’s BISS Injected ID to produce an Encrypted Session Word for each unit. This means that if an unauthorised person obtains an Encrypted Session Word, it is useless unless they also know the BISS Injected ID for the unit that the Encrypted Session Word was intended.

Scramble Option

To access the Scramble option, press the **Scramble** softkey in the `Mux Menu`. This enables security scrambling of the Encoder transmission to be switched on or off.

> NOTE...
>
> If the scrambling is switched between BISS Mode 1 and BISS-E, the session word, or the encrypted session word must be re-entered.

Table 4.117: Scramble Options (BISS)

Selected Option	Description
BISS Mode 1	Encoder output is scrambled. Scrambling key used is entered using the Session Word option.
BISS-E	Encoder output is scrambled. Scrambling key used is entered using the Enc Session Word option.
Off	Encoder output is not scrambled.

BISS Key Entry Option

> NOTE...
>
> This option is not available in Build version 2.2.0 and later.

To access the BISS[13] Key Entry option, press the **BISS Key Entry** softkey in the Mux Menu. This enables the scrambling key used in BISS Key Entry scrambling mode to be set (see the *Scramble Option*). The same scrambling code must be used at the receive end to unscramble the transmission.

For Mode 1, enter a 12 digit code using the keypad, then press the **Enter** softkey to enter the scrambling code.

Session Word Option

To access the Session Word option, press the **Session Word** softkey in the Mux Menu. A Session Word is the 48-bit code used to generate the 64-bit Control Word that is used to encrypt and decrypt the transport stream.

The sender and receiver(s) of the transmission share the Session Word, so that only the intended parties receive the transmission. The same Session Word must be used at the receive end.

If the Session Words are the same, then the IRDs are able to decrypt the broadcast. If the Session Words are different, the broadcast is not received.

> NOTE...
>
> Take precautions to avoid general knowledge of the Session Word.

The Session Word relates to the different types of BISS as follows:

- **BISS Mode 1**: All components are scrambled by a fixed control word, derived from a clear Session Word.
- **BISS-E**: All components are scrambled by a fixed control word, derived from an Encrypted Session Word.

Enc Session Word Option

To access the Enc Session Word option, press the **Enc Session Word** softkey in the Mux Menu. This is used with BISS-E. An Enc(rypted) Session Word is a 64-bit number that is transformed by the Encoder into a Session Word used to encrypt and decrypt the transport stream.

> NOTE...
>
> Take precautions to avoid general knowledge of the Encrypted Session Word.

BISS-E Injected Id Option

To access the BISS-E Injected Id option, press the **BISS-E Injected Id** softkey in the Mux Menu. This is only used with BISS-E and is an identifier for the unit, comprising a 56-bit hexadecimal word.

> NOTE...
>
> Take precautions to avoid general knowledge of the BISS-E Injected Id.

[13] BISS is implemented according to EBU Tech 3292 May 2002.

4.13 Remux

4.13.1 Introduction

If the Remux option module M2/EOM2/REMUX is fitted, there is an additional item in the `Mux Menu` (see *Figure 4.18*) and a further `Remux Module Menu` and `1.Service Menu`.

4.13.2 Addition to Mux Menu When Remux Fitted

Host Bit-rate Option

> NOTE...
> Prior to Build Version 3.0.0 the option was entitled Host Bit-rate (188) and Host Bit-rate (204).

This option refers to the multiplex in the local (host) Encoder.

To change the Host bit-rate, press the **Host Bit-rate** softkey in the `Mux Menu`. The Host Bit-rate can be in the range of 0 Mbit/s to 54.0000 Mbit/s.

> NOTE...
> The host bit-rate cannot exceed the output rate.

Table 4.118: Host Bit-rate Options

Selected Option	Description
Min: 0.0000 Mbit/s Max: 54.0000 Mbit/s Step Size: 0.0001 Mbit/s	Multiplexer Host bit-rate when in baseband output format and ASI output mode. Changing the bit-rate affects the automatic video bit-rate and video resolution calculations.

If the specified bit-rate is outside the valid input range, a confirmation screen is displayed which shows the maximum/minimum value allowed.

4.13.3 Remux Module Menu

Remux Mode Option

To access the Remux Mode option, press the **Remux Mode** softkey in the `Remux Module Menu`. See *Chapter 3, Options, Section 3.6.4, Function of Remultiplexer* for details of remux modes.

Table 4.119: Remux Mode Options

Selected Option	Description
Intelligent	PID clashes are automatically resolved.
Dumb!	PID clashes have to be changed manually. The user must ensure that all service clashes are resolved. The Encoder will not action a PID change that will cause a PID clash.

> NOTE...
> If Intelligent mode is selected, the Action On PID Error option (see *page 4-30*) in the `Setup/System/Advanced Menu` must be set to Auto Correct. If Dumb mode is selected, the Action On PID Error option must be set to Raise Alarm.

Packet Length Option

This option indicates the packet length. See *Section* This option indicates the packet length. See *Section 4.12.4, Packet Length Option* for details.

Bit-rate Option

This option indicates the bit-rate. See *Section 4.12.6, Bit-rate (188) and Bit-rate (204)* Option for details.

Status Only Options for the Remux Module Menu

The following options are status only and cannot be changed.

- Spare Bit-rate
- Input Bit-rate
- Output Bit-rate
- Host TS Output Rate
- Host Data Rate
- Input TS 1 (188)
- Data Rate 1 (188)
- Input TS 2 (188)
- Data Rate 2 (188)
- Input TS 3 (188)
- Data Rate 3 (188)
- Software Release

> NOTE...
> The maximum input bit-rate allowed on the Remux Module ASI inputs is 50 Mbit/s. If the input bit-rate exceeds 86 Mbit/s it will be incorrectly reported as a lower rate.

4.13.4 1.Service / 2.Service Menu

Output Option

To access the Output option, press the **Remux Mode** softkey in the `1.Service Menu`[14].

[14] This name changes to be the same as the Service Name. There could be more menus, depending upon the number of inputs to the Remux card.

Table 4.120: Output Options

Selected Option	Description
Off	The service is not included in the output.
On	The service is included in the output, unscrambled.
On (RAS)	The service is included in the output, scrambled and using RAS.
On (BISS Mux Key)	The service is included in the output, scrambled and the Session Word entered in the `Mux Menu`.
On (BISS Mode 1)	The service is included in the output, scrambled, using BISS Mode 1 and the Session Word entered in this menu.
On (BISS-E)	BISS-E is available from Build version 2.2.0 and later. The service is included in the output, scrambled, using BISS-E and the Enc(rypted) Session Word entered in this menu.

Source (BNC) Option

This option indicates the source of the input. It is for status only. *Table 4.121* indicates what is shown for the various inputs.

Table 4.121: Source (BNC) Options

Selected Option	Description
0	Host Encoder.
1, 2, 3	Remux inputs 1 to 3.

Short Name In Option

> NOTE...
> This option is only shown in ATSC mode.

To access the Short Name In option press the **Short Name In** softkey in the `1.Service Menu`. This option allows the Short Name In to be changed.

Short Name Out Option

> NOTE...
> This option is only shown in ATSC mode.

To access the Short Name Out option press the **Short Name Out** softkey in the `1.Service Menu`. This option allows the Short Name Out to be changed.

Name (In) Option

> NOTE...
> This option is only shown on an incoming Service menu (2-13.Service Menu).

To access the Name (In) option press the **Name (In)** softkey in the `2.Service Menu`. This option indicates the input service name. It is status only and cannot be changed.

Name Out Option

To access the Name Out option press the **Name Out** softkey in the `1.Service Menu`. This option allows the service output name to be changed.

Service Prov (In) Option

NOTE...
This option is only shown on an incoming Service menu (2-13.Service Menu).

This option indicates the input service provider's name. It is set for status only and cannot be changed.

Service Provider Option

To access the Service Provider option press the **Service Provider** softkey in the `1.Service Menu`. This option relates to the output service provider and allows the name to be changed.

Service Id (Out) Option

To access the Service Id (Out) option, press the **Service Id (Out)** softkey in the `1.Service Menu`. This enables the output Service Identity to be specified. It is the number at the start of the remuxxed services.

Table 4.122: Service Id (Out)Options

Selected Option	Description
Min: 1 Max: 65535 Step Size: 1	Service identity number.

Program Number (Out) Option

NOTE...
This option is only shown in ATSC mode.

To access the Program Number (Out) option, press the **Program Number (Out)** softkey in the `2.Service Menu`. This enables the output program number to be specified.

Table 4.123: Program Number (Out) Options

Selected Option	Description
Min: 1 Max: 65535 Step Size: 1	Program Number.

Major Channel Option

> NOTE...
> This option is only shown in ATSC mode.

To access the Major Channel option, press the **Major Channel** softkey in the `2.Service Menu`. This enables the major channel to be specified.

Minor Channel Option

> NOTE...
> This option is only shown in ATSC mode.

To access the Minor Channel option, press the **Minor Channel** softkey in the `2.Service Menu`. This enables the minor channel to be specified.

Logical Channel Option

To access the Logical Channel option, press the **Logical Channel** softkey in the `1.Service Menu`. This enables a number to be given to the Logical Channel.

CA Input Option

> NOTE...
> This option is only shown if there are incoming services.

This option indicates the type of CA present on the input. It is set for status only and cannot be changed.

BISS Key Code Option

> NOTE...
> This option is not available from Build version 2.2.

To access the BISS Key Code option, press the **BISS Key Code** softkey in the `1.Service Menu`. This enables the scrambling key used in BISS scrambling mode to be set. The same scrambling code must be used at the receive end to unscramble the transmission.

Enter up to 12 digits. If less then seven digits are entered, they are prefixed with 0s (zero) to give a seven digit code.

Enc Session Word Option

Refer to *Enc Session Word Option* on *page 4-96* for details.

Session Word Option

Refer to *Session Word Option* on *page 4-96* for details.

PMT PID Option

> NOTE...
> This option is status only for the Host Encoder but can be changed for incoming services.

To access the PMT PID option, press the **PMT PID** softkey in the 2.Service Menu. This shows the Program Map Table Packet Identifier.

Table 4.124: PMT PID Options

Selected Option		Description
Min:	32	Program Map Table Packet Identifier (PMT PID).
Max:	8190 (1FFEh)	
Step Size:	1	

PCR PID Option

> NOTE...
> This option is status only for the Host Encoder but can be changed for incoming services.

To access the PCR PID option, press the **PCR PID** softkey in the 2.Service Menu. This shows the Program Clock Reference Packet Identifier.

Table 4.125: PCR PID Options

Selected Option		Description
Min:	1	
Max:	8190 (1FFEh)	
Step Size:	1	

Video Option

> NOTE...
> This option is status only for the Host Encoder but can be changed for incoming services.

To access the Video option, press the **Video** softkey in the 2.Service Menu. This shows the Video PID.

Table 4.126: Video Options

Selected Option		Description
Min:	1	
Max:	8190 (1FFEh)	
Step Size:	1	

ECM (CA) PID Option

> NOTE...
>
> This option is status only for the Host Encoder but can be changed for incoming services. Available from Build version 2.2.0 and later.

To access the ECM (CA) PID option, press the **ECM (CA) PID** softkey in the `2.Service Menu`. This shows the Entitlement Control Message (Conditional Access) Packet Identifier (PID).

Table 4.127: ECM (CA) PID Options

Selected Option		Description
Min:	1	
Max:	8190 (1FFEh)	
Step Size:	1	

VBI PID Option

> NOTE...
>
> This option is status only for the Host Encoder but can be changed for incoming services. Available prior to Build version 2.2.0.

The VBI PID option is selected from the `2.Service Menu` by pressing the **VBI PID** softkey. The option is used for entering or updating the VBI PID.

Table 4.128: VBI PID Options

Selected Option		Description
Min:	1	
Max:	8190 (1FFEh)	
Step Size:	1	

Audio (Type of Audio) Option

> NOTES...
>
> 1. This option is status only for the Host Encoder but can be changed for incoming services. Available from Build version 2.2.0 and later.
> 2. The option could be Audio (MPEG-2), Audio (Dolby Digital) etc. The words in the brackets change according to the type of audio that was previously selected.

The Audio (Type of Audio) option is selected from the `2.Service Menu` by pressing the **Audio (Type of Audio)** softkey. The option is used for entering or updating audio PIDs.

To be DVB compliant, PIDs below 32 are reserved. Therefore PIDs 32 to 8191 are available for use. In the event of a clash, one of the PIDs will be changed by the Encoder’s internal checking algorithm

Table 4.129: Audio (Type of Audio) Options

Selected Option		Description
Min:	1	
Max:	8190 (1FFEh)	
Step Size:	1	

Data (Type of Data) Option

> NOTES...
>
> 1. This option is status only for the Host Encoder but can be changed for incoming services. Available from Build version 2.2.0 and later.
> 2. The option could be Data (RS-232), Data (RS-422) etc. The words in the brackets change according to the type of data that was previously selected.

The Data (Type of Data) option is selected from the `2.Service Menu` by pressing the **Data (Type of Data)** softkey. The option is used for entering or updating data PIDs.

Table 4.130: Data (Type of Data) Options

Selected Option		Description
Min:	1	
Max:	8190 (1FFEh)	
Step Size:	1	

Teletext Option

> NOTE...
>
> This option is status only for the Host Encoder but can be changed for incoming services. Available from Build version 2.2.0 and later.

The Teletext option is selected from the `2.Service Menu` by pressing the **Teletext** softkey. The option is used for entering or updating Teletext PIDs.

Table 4.131: Teletext Options

Selected Option		Description
Min:	1	
Max:	8190 (1FFEh)	
Step Size:	1	

4.14 IRD Menu (3.1 and later)

4.14.1 Overview

> NOTE...
> This option is available in Build version 3.1.0 and later.

The `IRD Menu` is selected from the `Setup Menu` by pressing the **IRD** softkey.

The menu controls the internal receiver decoder (IRD), if it is fitted. The IRD consists of the SD Decoder option M2/EOM2/DEC and either of the following demodulator options, M2/EOM2/QPSKDEMOD or M2/EOM2/SATDEMOD.

4.14.2 IRD Mode Option

To access the IRD Mode option, press the **IRD Mode** softkey in the `IRD Menu`.

Table 4.132: IRD Mode Options

Selected Option	Description
Independent	The IRD operates completely independently from the Encoder.
Tracking	The IRD tracks, as far as is possible, the modulator settings, minimising the amount of set-up required to monitor the local modulator output.

4.14.3 IRD TS Source Option

To access the IRD TS Source option, press the **IRD TS Source** softkey in the `IRD Menu`.

Table 4.133: IRD TS Source Options

Selected Option	Description
IRD Demod	The IRD will decode the transport stream from the demodulator.
Internal TS	The IRD will decode the host Encoder's internal transport stream.

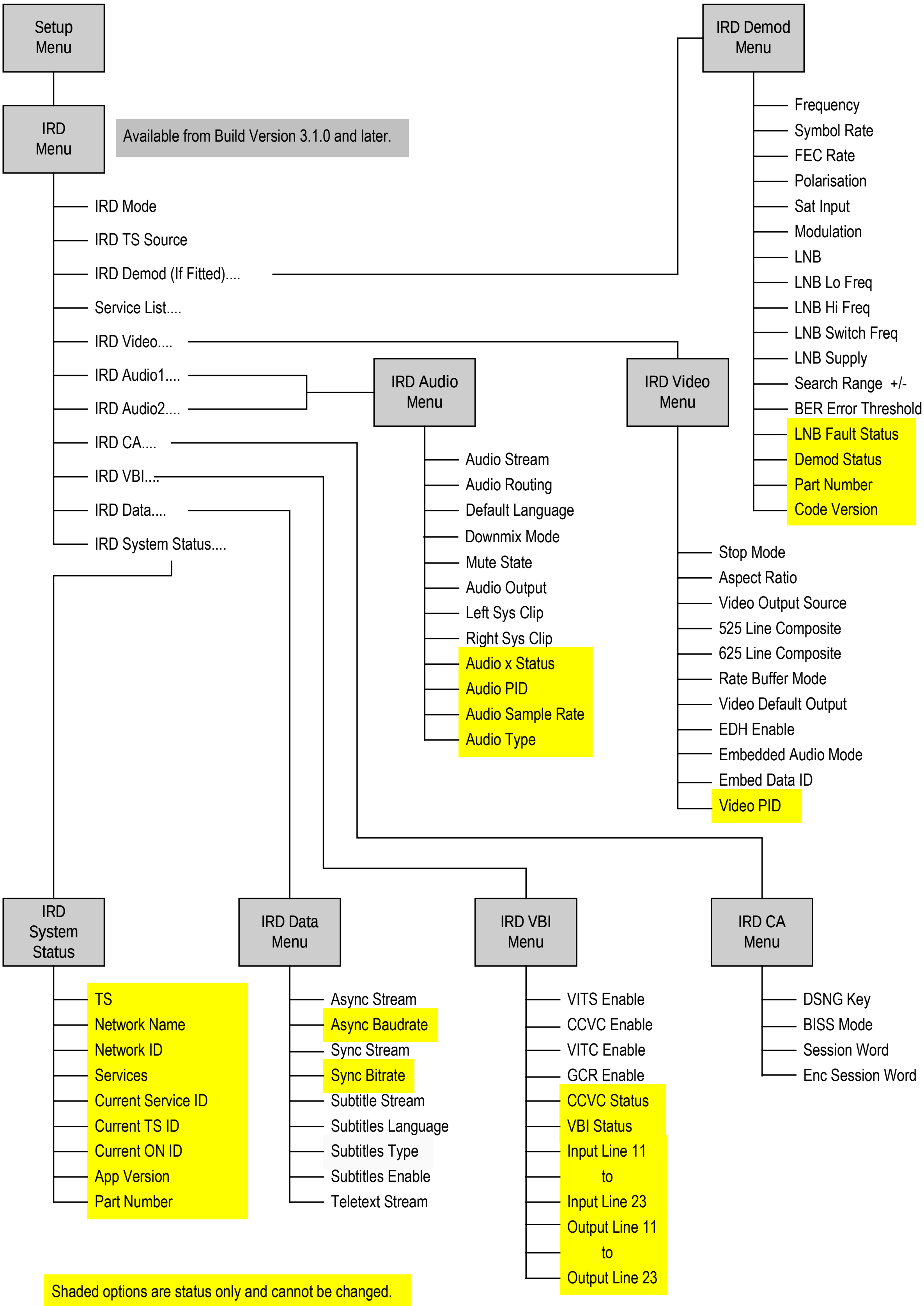


Figure 4.20: Menu Hierarchy – Setup/IRD Menu

4.14.4 IRD Demod Menu

Frequency Option

To access the Frequency option, press the **Frequency** softkey in the `IRD Demod Menu`.

This value is either the L-Band frequency for the demodulator to tune to if the LNB option is set to 'Direct RF', or it is the satellite frequency to tune to if the LNB option is set to 'Active'.

If the demodulator is M2/EOM2/QPSKDEMOD, and the IF input is selected, then this value is the IF frequency to tune to.

Symbol Rate Option

To access the Symbol Rate option, press the **Symbol Rate** softkey in the `IRD Demod Menu`. If the IRD is in tracking mode then this value is tied to that set for the satellite modulator, and cannot be altered.

Table 4.134: Symbol Rate Options

Valid Input Range		Description
Min (Low Sym Rate)	0.3000 Msym/s	Minimum with low symbol rate option M2/ES02/LSYM
Min	1.0000 Msym/s	
Max	30.0000 Msym/s	
Stepsize	0.0001 Msym/s	

FEC Rate Option

To access the FEC Rate option, press the **FEC Rate** softkey in the `IRD Demod Menu`. If the IRD is in tracking mode this value is tied to that set for the satellite modulator, and cannot be altered.

Table 4.135: FEC Rate Options

Selected Option	Description
1/2	IRD uses 1/2 FEC Rate
2/3	IRD uses 2/3 FEC Rate
3/4	IRD uses 3/4 FEC Rate
5/6	IRD uses 5/6 FEC Rate
7/8	IRD uses 7/8 FEC Rate
8/9	IRD uses 8/9 FEC Rate - only applicable if the modulation type is 8PSK

Polarisation Option

To access the Polarisation option, press the **Polarisation** softkey in the `IRD Demod Menu`.

Table 4.136: Polarisation Options

Selected Option	Description
Horizontal	If LNB power is enabled, output +18V to signal horizontal polarisation.
Vertical	If LNB power is enabled, output +13V to signal vertical polarisation.

Sat Input Option

To access the Sat Input option, press the **Sat Input** softkey in the `IRD Demod Menu`.

Table 4.137: Sat Input Options

Selected Option	Description
RF 1	Use Demod L-Band Input 1
RF 2	Use Demod L-Band Input 2
IF	Use Demod IF input (M2/EOM2/QPSKDEMOD only).

Modulation Option

To access the Modulation option, press the **Modulation** softkey in the `IRD Demod Menu`. If the IRD is in tracking mode this value is tied to that set for the satellite modulator, and cannot be altered.

Table 4.138: Modulation Options

Selected Option	Description
BPSK	M2/EOM2/QPSKDEMOD and M2/ESO2/LSYM required.
QPSK	
8PSK	M2/EOM2/SATDEMOD and M2/ESO2/8PSKDEMOD required.
16QAM	M2/EOM2/SATDEMOD and M2/ESO2/16QAMDEMOD required.

LNB Option

To access the LNB option, press the **LNB** softkey in the `IRD Demod Menu`.

Table 4.139: LNB Options

Selected Option	Description
Active	There is an LNB present.
Direct RF	The Demod is being fed direct RF.

LNB Lo Freq Option

To access the LNB Lo Freq option, press the **LNB Lo Freq** softkey in the `IRD Demod Menu`.

This value should be set to the LNB's lower local oscillator frequency. If the LNB has only one local oscillator then both the LNB Lo and LNB Hi Freq options should be set to that value.

LNB Hi Freq Option

To access the LNB Hi Freq option, press the **LNB Hi Freq** softkey in the `IRD Demod Menu`.

This value should be set to the LNB's higher local oscillator frequency.

LNB Switch Freq Option

To access the LNB Switch Freq option, press the **LNB Switch Freq** softkey in the `IRD Demod Menu`.

If the LNB has two local oscillators, this value sets the frequency above which the higher local oscillator will be used. The switching between the local oscillators is by a 22 kHz tone.

LNB Supply

To access the LNB option, press the **LNB** softkey in the `IRD Demod Menu`.

Table 4.140: LNB Supply Options

Selected Option	Description
Disabled	LNB Supply Off
Enabled	LNB Supply On
Boost	LNB Supply (approximately 1 V higher than enabled)

Search Range Option

> NOTE...
> The search range is not applicable if the Sat Input is set to IF.

To access the Search Range option, press the **Search Range** softkey in the `IRD Demod Menu`.

Table 4.141: Search Range Options

Valid Input Range	Description
Min	0.1 kHz
Max	5.0 kHz

BER Threshold Option

To access the BER Threshold option, press the **BER Threshold** softkey in the `IRD Demod Menu`. This sets the BER level that, if exceeded, generates a BER Alarm.

Status Only Options for the IRD Demod Menu

The following options are for status only and cannot be changed.

- LNB Fault Status
- Demod Status
- Part Number
- Code Version

4.14.5 Service List Menu

To access the `Service List Menu`, press the **Service List** softkey in the `IRD Menu`.

This lists all the services found in the current transport stream and allows the user to select which one is to be decoded, if there is more than one.

4.14.6 IRD Video Menu

Stop Mode Option

To access the Stop Mode option, press the **Stop Mode** softkey in the `IRD Video Menu`.

Table 4.142: Stop Mode Options

Selected Option	Description
Blank	Outputs a blank screen if the video fails.
Freeze	Freezes on the last picture if the video fails.

Aspect Ratio Option

To access the Aspect Ratio option, press the **Aspect Ratio** softkey in the `IRD Video Menu`.

Table 4.143: Aspect Ratio Options

Selected Option	Description
4:3	Set if the video monitor aspect ratio is 4:3.
16:9	Set if the video monitor aspect ratio is 16:9.

Video Output Source Option

To access the Video Output Source option, press the **Video Output Source** softkey in the `IRD Video Menu`.

Table 4.144: Video Output Source Options

Selected Option	Description
Normal Video	The decoded video stream is output.
Various 525 and 625 test patterns	The selected test pattern is output.

525 Line Composite Option

To access the 525 Line Composite option, press the **525 Line Composite** softkey in the IRD Video Menu.

Table 4.145: 525 Line Composite Options

Selected Option	Description
525 NTSC M	The composite output standard for a 525 line input is NTSC M.
525 NTSC M No Pedestal	The composite output standard for a 525 line input is NTSC M with no pedestal.
525 PAL M	The composite output standard for a 525 line input is PAL M.

625 Line Composite Option

To access the 625 Line Composite option, press the **625 Line Composite** softkey in the IRD Video Menu.

Table 4.146: 625 Line Composite Options

Selected Option	Description
625 PAL I	The composite output standard for a 625 line input is PAL I
625 PAL B/G	The composite output standard for a 625 line input is PAL B/G
625 SECAM	The composite output standard for a 625 line input is SECAM
PAL N	The composite output standard for a 625 line input is PAL N

Rate Buffer Mode Option

To access the Rate Buffer Mode option, press the **Rate Buffer Mode** softkey in the IRD Video Menu.

Table 4.147: Rate Buffer Mode Options

Selected Option	Description
Normal	This is the normal setting.
Small	This should only be used when decoding System 3000 Encoder generated transport streams.

Video Default Output Option

To access the Video Default Output option, press the **Video Default Output** softkey in the IRD Video Menu. This defines the default video line standard when there is no video service to be decoded.

Table 4.148: Video Default Output Options

Selected Option	Description
625 Line	
525 Line	

EDH Enable Option

To access the EDH Enable option, press the **EDH Enable** softkey in the IRD Video Menu. This allows the pass-through of Error Detection Hierarchy (EDH) to be either enabled or disabled.

Table 4.149: EDH Enable Options

Selected Option	Description
True	Pass-through of EDH is enabled.
False	Pass-through of EDH is disabled.

Embedded Audio Mode Option

To access the Embedded Audio Mode option, press the **Embedded Audio Mode** softkey in the IRD Video Menu.

Table 4.150: Embedded Audio Mode Options

Selected Option	Description
No Audio	No audio is embedded in the SDI output.
Audio 1 Only	Audio Channel 1 is embedded in the SDI output.
Audio 2 Only	Audio Channel 2 is embedded in the SDI output.
Audio 1 & 2	Audio Channels 1 and 2 are embedded in the SDI output.

Embed Data ID Option

To access the Embed Data ID option, press the **Embed Data ID** softkey in the IRD Video Menu. This sets the Data ID that is used for the embedded audio in the SDI output.

Table 4.151: Embed Data ID Options

Selected Option	Description
Group 1, Audio 1 to 4	DID 0x2FF
Group 2, Audio 5 to 8	DID 0x1FD
Group 3, Audio 9 to 12	DID 0x1F8
Group 4, Audio 13 to 16	DID 0x2F9

Video PID

The PID of the video service currently being decoded is displayed, but cannot be changed.

4.14.7 IRD Audio 1 and Audio 2 Menus

> NOTE...
> The menu structures are identical for Audio Channel 1 and Audio Channel 2.

Audio Stream

This shows the currently selected audio stream. To access the Audio Stream option, press the **Audio Stream** softkey in the `IRD Audio Menu`. It is then possible to select the audio stream to be decoded from the audio streams present in the currently selected service.

Audio Routing Option

To access the Audio Routing option, press the **Audio Routing** softkey in the `IRD Audio Menu`.

Table 4.152: Audio Routing Options

Selected Option	Description
Normal Stereo	Normal stereo output.
Left Both	Left channel routed to both outputs.
Right Both	Right channel routed to both outputs.

> NOTE...
> The Audio Routing setting has no effect if the audio stream is Dolby Digital (AC-3) encoded.

Default Language Option

To access the Default Language option, press the **Default Language** softkey in the `IRD Audio Menu`. If a service contains more than one audio stream, the decoder defaults to the first audio stream of the default language.

Downmix Mode Option

> NOTE...
> This option is only applicable with Dolby AC-3 audio services.

To access the Downmix Mode option, press the **Downmix Mode** softkey in the `IRD Audio Menu`.

If the AC-3 service has more than two channels the audio decoder downmixes to produce a stereo pair. The AC-3 standard allows for downmixing to either a Dolby Pro Logic compatible stereo signal (designated LT RT) or a conventional stereo signal (designated LO RO).

Table 4.153: Downmix Mode Options

Selected Option	Description
Stereo Pair	
Dolby Pro Logic Stereo	

Mute State Option

To access the Mute State option, press the **Mute State** softkey in the `IRD Audio Menu`. The Mute State can either be set 'On', i.e. no audio output, or 'Off', audio output present.

Audio Output Option

To access the Audio Output option, press the **Audio Output** softkey in the `IRD Audio Menu`.

Table 4.154: Audio Output Options

Selected Option	Description
Analogue Output	Analogue Audio on both left and right channels.
IEC958 Consumer	Uncompressed stereo on right output that conforms to SPDIF formatting.
IEC958 Pro (AES/EBU)	Uncompressed stereo on right output that conforms to AES/EBU formatting.
AC-3 as IEC958 Consumer	Compressed up to 5 + 1 on right output only. Only if the input stream is Dolby Digital (AC-3) encoded.

> NOTE...
> To obtain a linear PCM digital output the Audio Output must be set to IEC 958 Prof.

Left Sys Clip Option

To access the Left Sys Clip option, press the **Left Sys Clip** softkey in the `IRD Audio Menu`. This sets the audio clip level of the left channel between 6 dBm and 18 dBm.

Right Sys Clip Option

To access the Right Sys Clip option, press the **Right Sys Clip** softkey in the `IRD Audio Menu`. This sets the audio clip level of the right channel between 6 dBm and 18 dBm.

Status Only Options for the IRD Audio Menu

The following options are for status only and cannot be changed.

- Audio Status
- Audio PID
- Audio Sample Rate
- Audio Type

4.14.8 IRD CA Menu

Overview

If the IRD is operating in tracking mode, then the IRD CA menu has no options because the CA is automatically configured to match the settings of the host Encoder.

DSNG Key Option

To access the DSNG Key option, press the **DSNG Key** softkey in the `IRD CA Menu`. This sets the TANDBERG RAS DSNG key, which is a seven digit number.

BISS Mode Option

To access the BISS Mode option, press the **BISS Mode** softkey in the `IRD CA Menu`.

Table 4.155: BISS Mode Options

Selected Option	Description
Off	BISS descrambling is off.
BISS Mode 1	BISS descrambling using the entered session word is on.
BISS-E	BISS descrambling using the entered encrypted session word together with the Encoder's injected BISS ID.

Session Word Option

This option is only visible if the BISS mode has been set to BISS Mode 1. To access the Session Word option, press the **Session Word** softkey in the `IRD CA Menu`. This sets the 12-digit BISS session word to be used by the IRD. For security, the entered session word cannot be read back.

Enc Session Word Option

This option is only visible if the BISS mode has been set to BISS-E. To access the Enc Session Word option, press the Enc. **Session Word** softkey in the `IRD CA Menu`. This sets the 16 digit encrypted BISS session word to be used by the IRD. For security the entered encrypted session word cannot be read back.

4.14.9 IRD VBI Menu

VITS Enable Option

To access the VITS Enable option, press the **VITS Enable** softkey in the `IRD VBI Menu`.

Table 4.156: VITS Enable Options

Selected Option	Description
Disabled	VITS test signal insertion disabled.
CCIR	CCIR[ITU-R] VITS inserted on lines 17/18/329/330 (625 Lines).
FCC/UK	525 Line: FCC VITS inserted on lines 17/280 625 Line: UK standard VITS inserted on lines 19, 20, 332, 333

CCVC Enable Option

To access the CCVC Enable option, press the **CCVC Enable** softkey in the `IRD VBI Menu`. This can either enable or disable the reinsertion of Closed Caption or VCHIP data in to the VBI.

VITC Enable Option

To access the VITC Enable option, press the **VITC Enable** softkey in the `IRD VBI Menu`. This can either enable or disable the insertion of the VITC signal.

GCR Enable Option

To access the GCR Enable option, press the **GCR Enable** softkey in the `IRD VBI Menu`. This can either enable or disable the insertion of the Ghost Cancellation Reference (GCR) signal on line 19 for 525 line signals, or line 318 for 625 line signals.

> NOTE...
> The GCR signal only appears on the SDI output NOT the analogue output.

Status Only Options for the IRD VBI Menu

The following options are for status only and cannot be changed.

- CCVC Status: present or not present on the input signal.
- VBI Status: present or not present on the input signal.
- Input Lines: what, if any VBI is present on each input line.
- Output Lines: what, if any VBI is present on each line output.

4.14.10 IRD Data Menu

Async Stream Option

To access the Async Stream option, press the **Async Stream** softkey in the `IRD Data Menu`. This is used to select the asynchronous data stream to be decoded, from those present in the selected service.

Async Baudrate

This gives the baud-rate of the selected asynchronous data stream.

Sync Stream Option

To access the Sync Stream option, press the **Sync Stream** softkey in the `IRD Data Menu`. This is used to select the synchronous data stream to be decoded, from those present in the selected service.

Sync Bitrate

This gives the bit-rate of the selected synchronous data stream.

Subtitle Stream Option

To access the Subtitle Stream option, press the **Subtitle Stream** softkey in the `IRD Data Menu`. This is used to select the subtitle stream to be decoded, from those present in the selected service.

Subtitles Language Option

To access the Subtitles Language option, press the **Subtitles Language** softkey in the `IRD Data Menu`. This is used to select the subtitles default language. When a service is selected, the IRD defaults to decoding the subtitles stream with the default language, if one is present.

Subtitles Type Option

To access the Subtitles Type option, press the **Subtitles Type** softkey in the `IRD Data Menu`. This is used to select the subtitles default type. When a service is selected, the IRD will default to decoding the subtitles stream with the default language, and of the default type, if one is present.

Subtitles Enable Option

To access the Subtitles Enable option, press the **Subtitles Enable** softkey in the `IRD Data Menu`. This can be set to enable or disable the reinsertion of subtitles in to the VBI.

Table 4.157: Subtitles Enable Options

Selected Option	Description
True	Enable the reinsertion of subtitles in to the VBI.
False	Disable the reinsertion of subtitles in to the VBI

Teletext Stream Option

To access the Teletext Stream option, press the **Teletext Stream** softkey in the IRD Data Menu. This is used to select the Teletext stream to be decoded, from those present in the selected service.

4.14.11 IRD System Status Menu

The IRD System Status Menu has a number of options which are status only and cannot be changed:

- TS
- Network Name
- Network ID
- Services
- Current Service ID
- Current TS ID
- Current ON ID
- App Version
- Part Number

4.15 Errors Menu

4.15.1 Overview

From the 2U Encoder the Errors Menu can be selected from the Advanced Menu by pressing the **Errors** softkey. From the 1U Encoder the Errors Menu can be selected from the Main Menu by selecting the **Errors** option.

New errors are reported to the front panel display approximately every 30 seconds.

4.15.2 Active Errors Option

To access the Active Errors option, press the **Active Errors** softkey in the Errors Menu. This gives a list of any current errors.

4.15.3 Error Masks Menu

Status of Error Masks

To access the Error Masks option, press the **Error Masks** softkey in the Error Masks Menu. This allows any of the error messages to be masked. There are three states for the error message: Alm, Fail or Off.

- **Alm** (Alarm) shows the error message and triggers the alarm relay
- **Fail** shows the error message and triggers both the fail and alarm relays
- **Off** does not show the error message and does not trigger any relays

Refer to *Annex H, Error Messages* for details of all the error messages. Press the softkey next to a message. As the key is pressed the status of the message changes.

Restore Defaults

To access the Restore Defaults option, press the **Restore Defaults** softkey in the `Error Masks Menu`. This sets alarm, fail and error messages to the factory defaults.

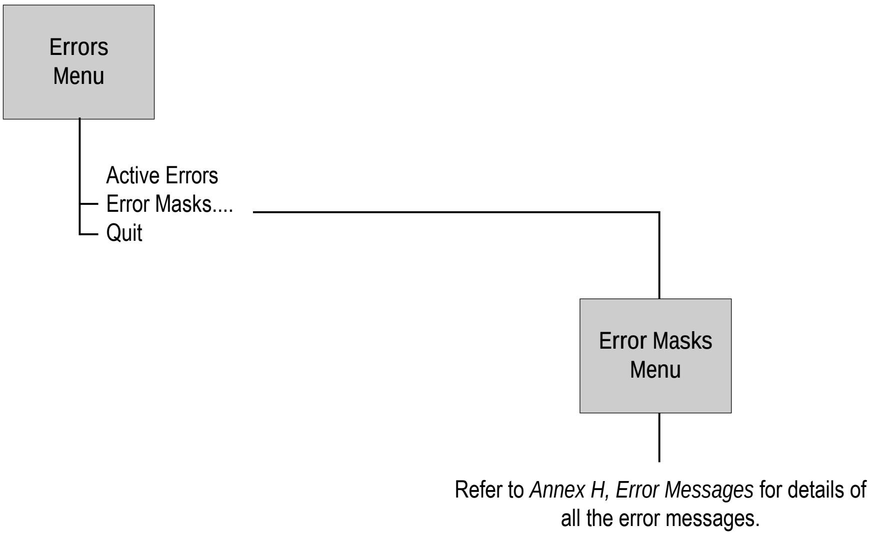


Figure 4.21: Menu Hierarchy – Error Masks Menu

4.16 Diagnostics Menu

See *Chapter 6, Preventive Maintenance and Fault-finding* for information about the `Diagnostics Menu`.

4.17 Configs Menu

4.17.1 Accessing the Menu

The `Configs Menu` can be selected from the `Summary Screen` by pressing the **Cfgs** softkey or from the `Advanced Menu` by pressing the **Configs** softkey.

4.17.2 Overview

The Encoder has a set of 16 default configurations for both 525 and 625 line standards. These configurations provide the basis for quick and easy configuration of the operating parameters for common set-ups, without having to enter all parameters individually. The default configurations can be used as they are, or loaded as the active configuration and edited as required.

The Encoder normally holds the following configurations:

- One Active Configuration (it runs the Encoder)
- Sixteen User configurations (in the User FLASH)
- Sixteen Backup configurations (in Backup FLASH)
- Sixteen 525 factory default configurations
- Sixteen 625 factory default configurations

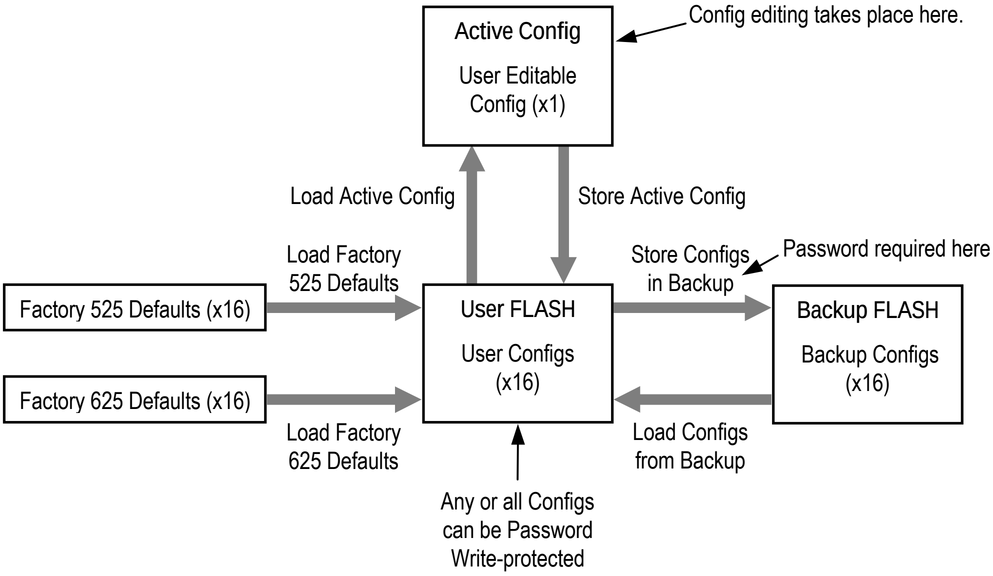


Figure 4.22: Configuration, Graphical Explanation.

4.17.3 Active Configuration

This is the configuration that the Encoder is currently using. It is loaded from one of the 16 user configuration locations (**Load Active Config**). It can be edited at any time and also stored back as one of the user configurations (**Store Active Config**).

4.17.4 User Configurations

Configurations loaded into the user FLASH become user configurations. Any one of the user configurations can be loaded as an active configuration (**Load Active Config**). A modified active configuration can be copied back into one of the user FLASH locations (**Store Active Config**) where it can be password write-protected. A user configuration that is write-protected cannot be overwritten. The 16 user configurations can be saved in the backup FLASH (**Store Configs in Backup**).

> CAUTION...
>
> Any user configuration that is not write-protected, will be overwritten when Factory Default or Backup configurations are loaded to the user FLASH.

4.17.5 Backup Configurations

Backup FLASH stores a copy of each of the 16 user configurations when you select **Store Configs in Backup**, you will be asked for the password here.

If unsure of the user configurations or they become inadvertently modified, the user configurations can be returned to a known state at any time by the command **Load Configs from Backup**. This loads the 16 backup configurations to the User FLASH, overwriting all user configurations that are not write-protected. Individual configurations cannot be selected for loading to the User FLASH.

The active (current) configuration is unaltered when you select **Load Configs from Backup**.

4.17.6 Factory Default Configurations

There are 16 default configurations for both 525 and 625 line standards. They are provided as examples and can be used as they are, if their settings suit your needs. They are non-editable. The 16 default configurations (525 or 625) can be loaded to the user FLASH at any time by selecting **Factory 525 (or 625) Defaults**. This will overwrite all user configurations that are not write-protected. Individual configurations cannot be selected for loading to the User FLASH.

4.17.7 Configuration, Write-Protection

Any or all of the 16 user configurations can be write-protected by selecting **Write Protect Configs**. A password is asked for. With the correct password entered, the question **Write protect Which Configs?** appears. Select which configurations to protect by pressing the associated softkey in each case. This toggles the write-protect condition (On or Off) for each individual configuration. The letter **R** when shown to the left of the config number, indicates that the configuration is read-only (write-protected).

Any configuration that is write-protected will be displayed as read-only if attempting to overwrite it.

4.17.8 Quick Configuration From the Summary Screen

The sixteen predefined user configurations are a quick and easy way to configure the Encoder without having to enter individual parameters. The `Config Menu` can be accessed directly from the summary screen (see *Section 4.4.2, Summary Screen*) by pressing the **Cfgs** softkey. Press the **Load Active Config** softkey (see *Load Active Config Option* on *page 4-122*) and a list of configurations is shown (refer to *Annex C, Predefined User Configurations* for details of individual configurations). Select the required one by pressing the associated softkey. Nothing more need be done. The Encoder is ready for use.



This menu provides options for loading and storing predefined configurations and updating and restoring backup configurations.

4.17.9 Load Active Config Option

To access the Load Active Config option, press the **Load Active Config** softkey in the `Config Menu`. Use the softkeys to select the required configuration to be loaded. See *Annex C, Predefined User Configurations* for details of predefined configurations.

4.17.10 Store Active Config Option

To access the Store Active Config option, press the **Store Active Config** softkey in the `Config Menu`. Use the softkeys to select the position where the configuration is to be stored.

> NOTE...
>
> There is no confirmation screen, the configuration is overwritten immediately the softkey indicating the storage position is selected.

4.17.11 Load Configs From Backup Option

This option enables the 16 user configurations to be overwritten with the 16 backup configurations. To update the backup configurations press the **Load Configs from Backup** softkey in the `Config Menu`.

> NOTE...
>
> The 16 backup configurations are loaded immediately the **Load Configs from Backup** softkey is pressed although the current Encoder configuration remains unchanged.

4.17.12 Store Configs in Backup Option

This enables the 16 user configurations to be stored in the backup, and may be password protected. Press the **Store Configs in Backup** softkey in the `Config Menu`.

> NOTE...
>
> The 16 backup configurations are stored immediately the **Store Configs in Backup** softkey is pressed.

4.17.13 Factory 525 Defaults Option

This option enables the 16 user configurations to be overwritten by the factory default settings for 525 line/29.97 Hz video operation. Press the **Factory 525 Defaults** softkey in the `Config` Menu.

> NOTE...
> The Factory 525 Defaults option is activated immediately.

4.17.14 Factory 625 Defaults Option

The Factory 625 Defaults option is very similar to the Factory 525 Defaults option, except that it overwrites the 16 user configurations with the factory default settings for 625 line/25 Hz video operation. Press the **Factory 625 Defaults** softkey in the `Config` Menu.

> NOTE...
> The Factory 625 Defaults option is activated immediately.

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Chapter 5

Web Browser Interface

Contents

List of Figures

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5.1 Introduction

There is a range of diagnostic and other utilities that can be accessed via a web browser, such as Internet Explorer. Before these can be accessed it is important to ensure that the Internet Explorer is correctly set up for the web browser.

> NOTE...
> Netscape not currently supported.

5.2 How to Set Up Internet Explorer For the Web Browser Interface

To set up Internet Explorer proceed as follows:

1. In Internet Explorer version 5, on the menu bar click **Tools, Internet Options**. This displays the **Internet Options** dialog box with tabs across the top.
2. In the **General** tab click **Settings** (see *Figure 5.1*)**.**

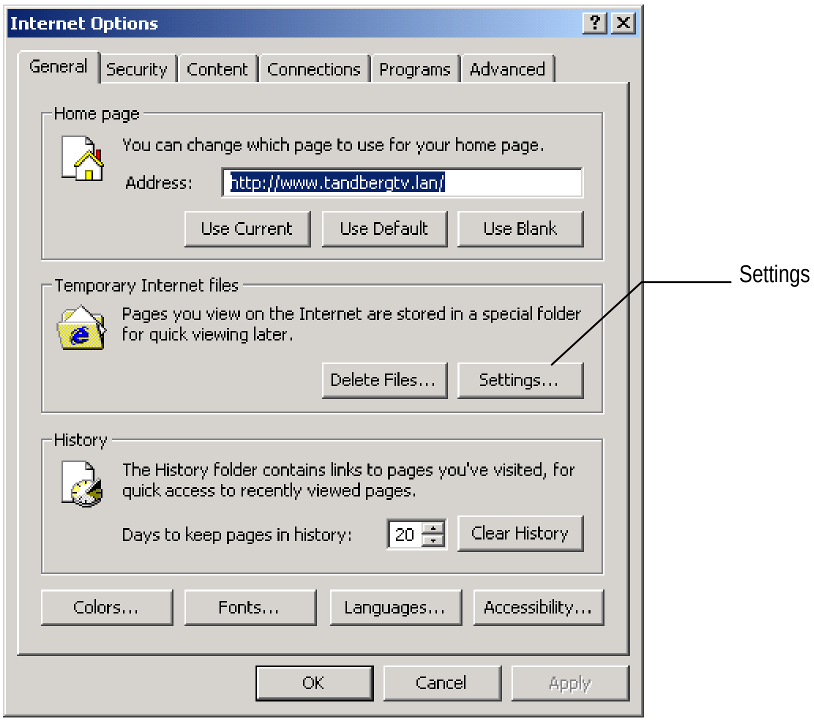


Figure 5.1: Internet Options Dialog Box

3. This opens the **Settings** dialog box (see *Figure 5.2*).

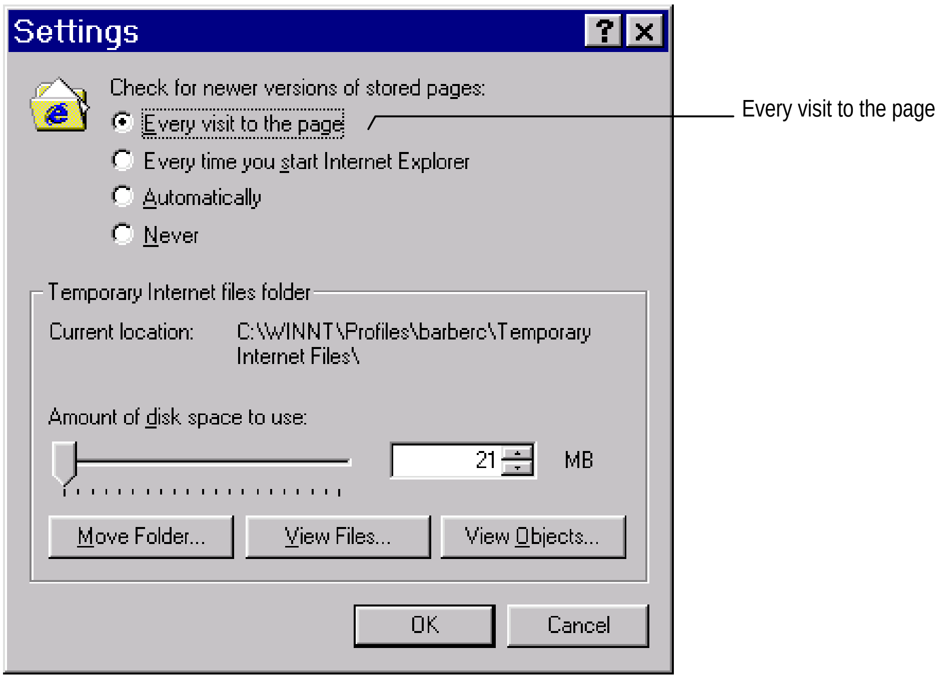


Figure 5.2: Settings Dialog Box

4. For **Check for newer versions of stored pages**, select **Every visit to the page** or any changes made to the pages will not be displayed. Click **OK** to save the changes and return to the **Internet Options** dialog box.
5. If Internet Explorer currently connects to the internet via a proxy server then it must be reconfigured to connect directly to the Encoder, bypassing the proxy server. Click the **Connections** tab (see *Figure 5.3*).

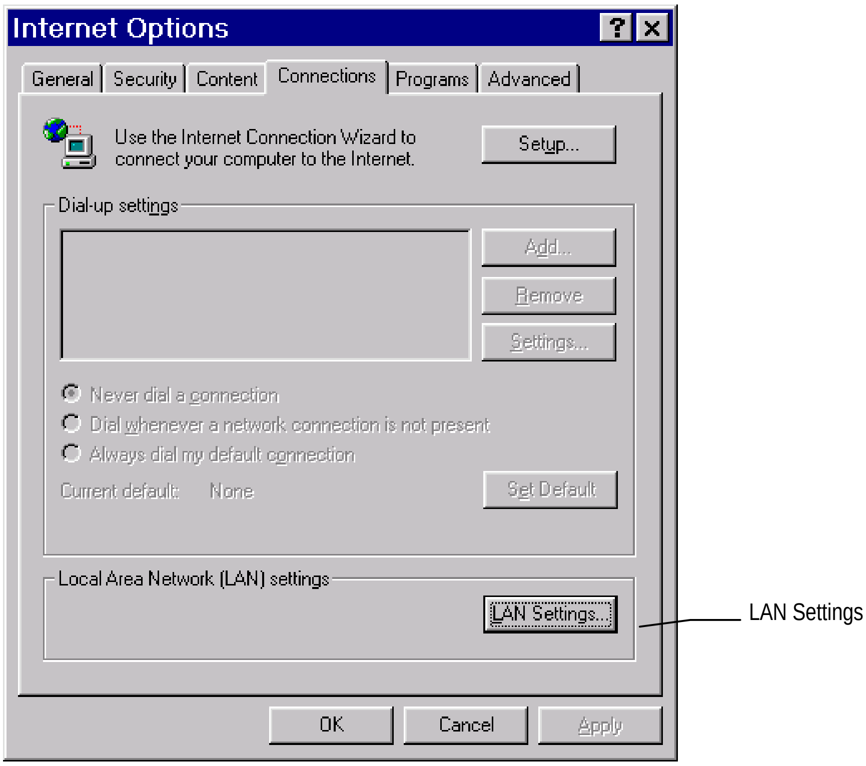


Figure 5.3: Connections Tab

6. Click **LAN Settings** to open the **Local Area Network (LAN) Settings** dialog box (see *Figure 5.4*).

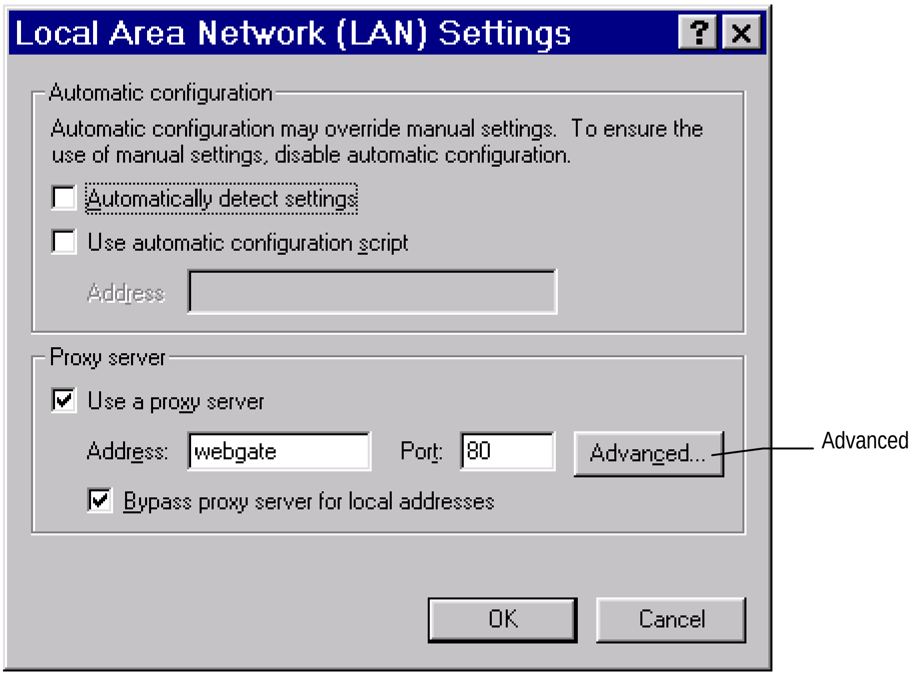


Figure 5.4: Local Area Network (LAN) Settings Dialog Box

7. Click **Advanced** to open the **Proxy Settings** dialog box (see *Figure 5.5*).

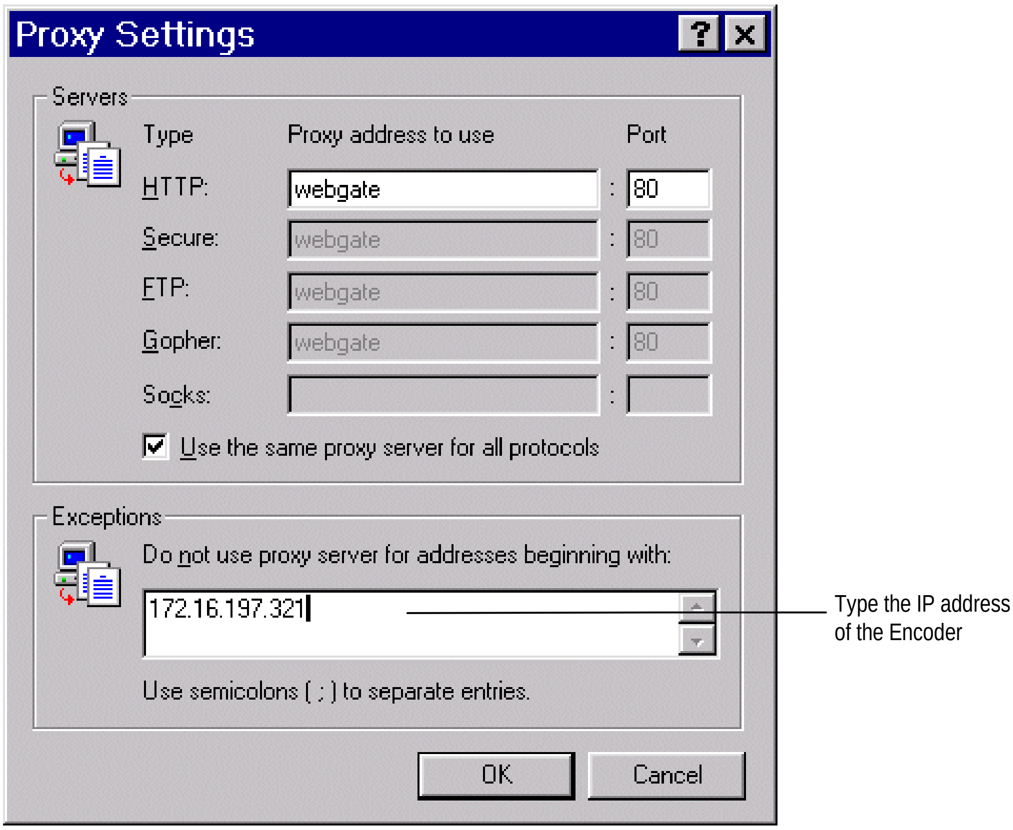


Figure 5.5: Proxy Settings Dialog Box

8. In the Exceptions area type the IP address of the Encoder.
9. Click **OK** as many times as necessary to close all dialog boxes until only the Internet Explorer window is open.

For Internet Explorer version 4 the same selections must be made, but the process starts from the **View** menu.

Once Explorer has been set up, type the IP address of the Encoder to be accessed in the address bar (e.g. http://172.16.197.245), press **Return** and a connection is established. After a few seconds, a welcome screen appears followed by a window as in *Figure 5.6*.

To find the IP address of the Encoder refer to *Section 4.7.4, Remote Control Menu, IP Address Option*.

5.3 Web Browser Interface Options

The **Web Browser** interface gives access to the options as shown in *Figure 5.6*. Some options show diagnostic information for parts of the Encoder.

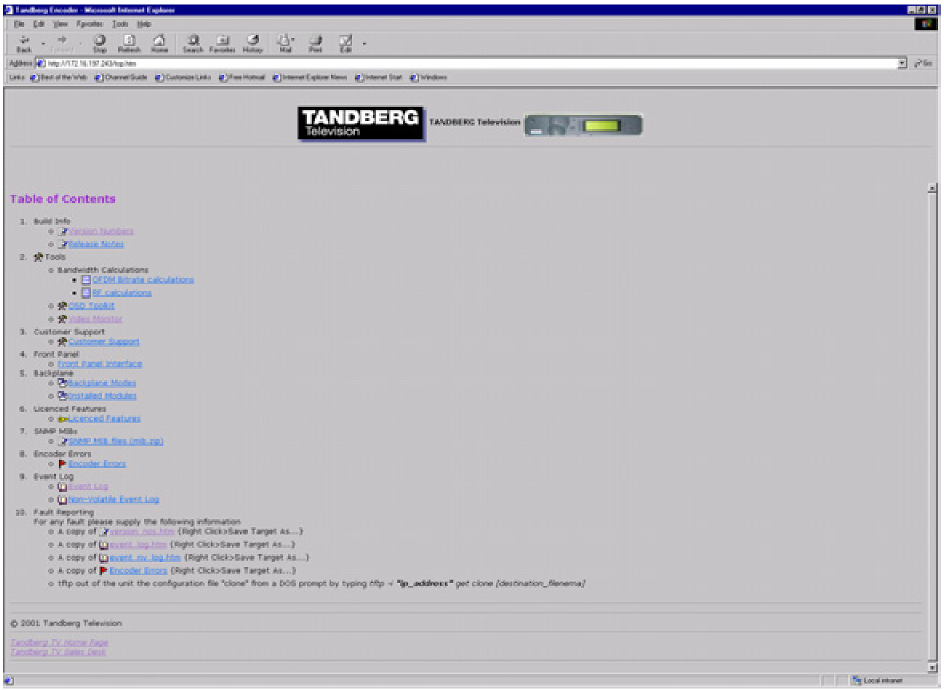


Figure 5.6: Web Browser Interface Options

Option 1, **Build Info** - displays a screen similar to *Figure 5.7* when clicking **Version Numbers** or *Figure 5.8* when clicking **Release Notes**.

Full information on the build status of the Encoder is given here. This can be important when a software upgrade is to be made because it may require a certain level of hardware modification as well.

The software releases, found in the release notes screen, are very useful in identifying any known defects and the various code releases which fixed them.

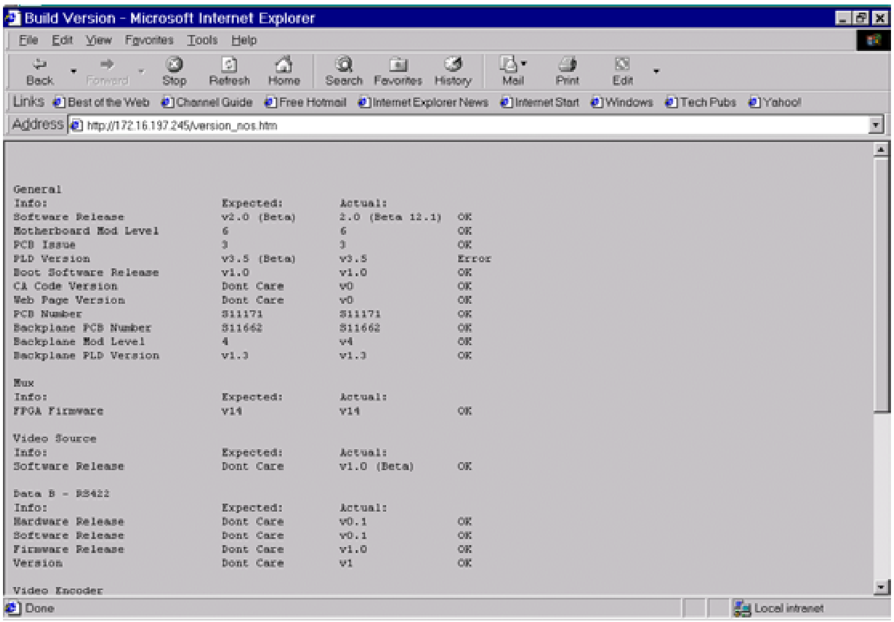


Figure 5.7: Build Info – Version Numbers

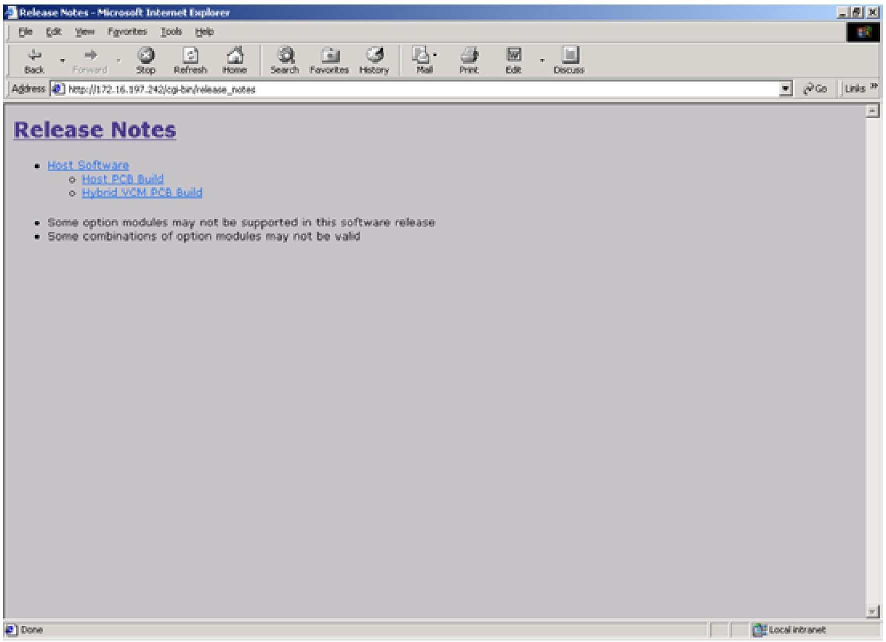


Figure 5.8: Build Info - Release Notes

Option 2, **Tools**[1] - displays a screen similar to:

- *Figure 5.9* when clicking **Bandwidth Calculations, OFDM Bit-rate Calculations**
- *Figure 5.10* when clicking **Bandwidth Calculations, RF Calculations**
- *Figure 5.11* when clicking **OSD Toolkit**
- *Figure 5.12* when clicking **Video Monitor**

[1] Prior to Build Version 3.0.0 this was called **Bandwidth Calculations**.

Bandwidth Calculations, OFDM Bit-rate Calculations - The Bit Rate Calculator (see *Figure 5.9*) allows you to enter various parameters and the optimal bit-rate (Mbit/s) is automatically calculated for 204 bytes and 188 bytes.

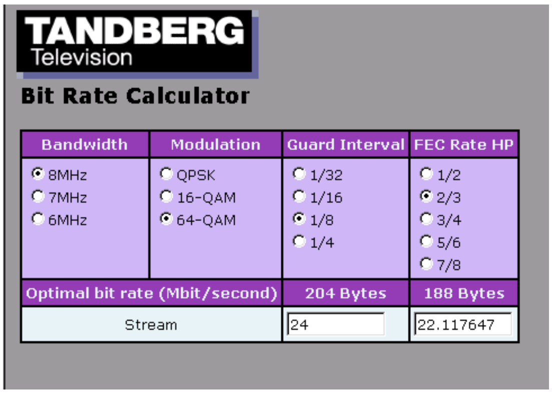


Figure 5.9: Tools - Bandwidth Calculations- OFDM Bit-rate Calculations

Bandwidth Calculations, RF Calculations - The Modulation Help (see *Figure 5.10*) allows you to see the difference that various parameters have upon the symbol rate and bandwidth.

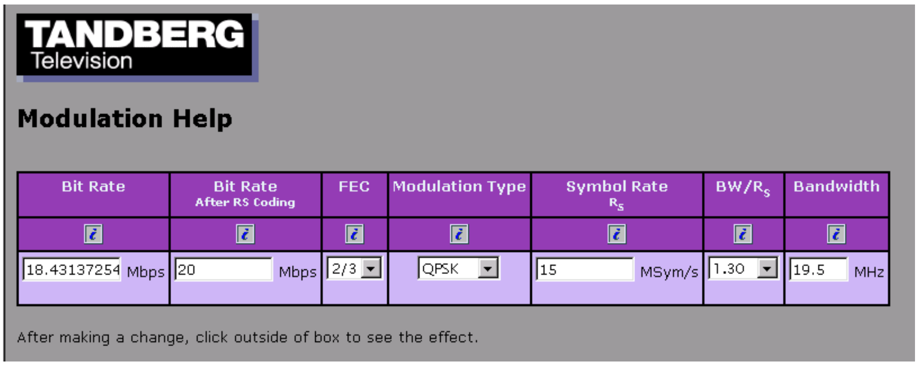


Figure 5.10: Tools - Bandwidth Calculations- RF Calculations

OSD Toolkit - The OSD Toolkit (see *Figure 5.11*) consists of an OSD Creator (Creator.exe) and OSD Loader (OSD.exe). There is a logo overlay facility allowing broadcasters to trademark material whereby the Encoder is able to overlay broadcasters trademarks/logos onto the active video. *See Annex E, Creating and Downloading a Logo* for information on how to use the programs.

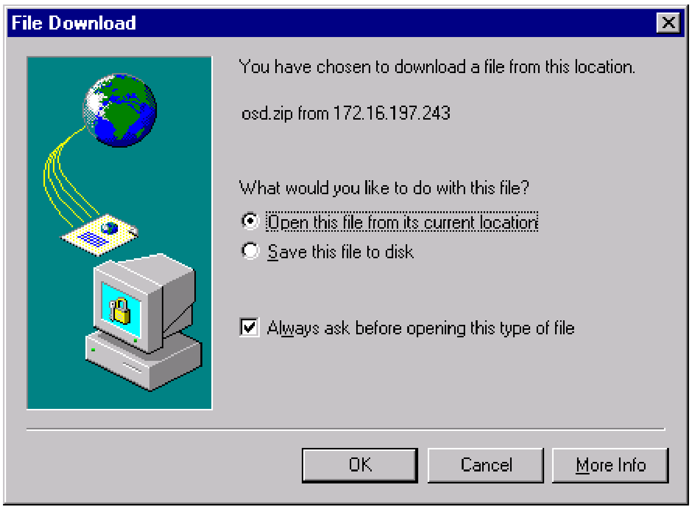


Figure 5.11: Tools – OSD Toolkit

Video Monitor - The Video Monitor (see *Figure 5.12*) displays the video input to the Encoder.



Figure 5.12: Tools – Video Monitor

Option 3, **Customer Support** - has the contact information for Customer Services in various countries throughout the world.

Option 4, **Front Panel** - is for TANDBERG Television internal use only.

Option 5, **Backplane** - displays a screen similar to:

- *Figure 5.13* when clicking **Backplane Modes**. The various backplane modes are shown. These indicate all the combinations of option modules allowed.
- *Figure 5.14* when clicking **Installed Modules**. The current configuration of installed modules is shown.

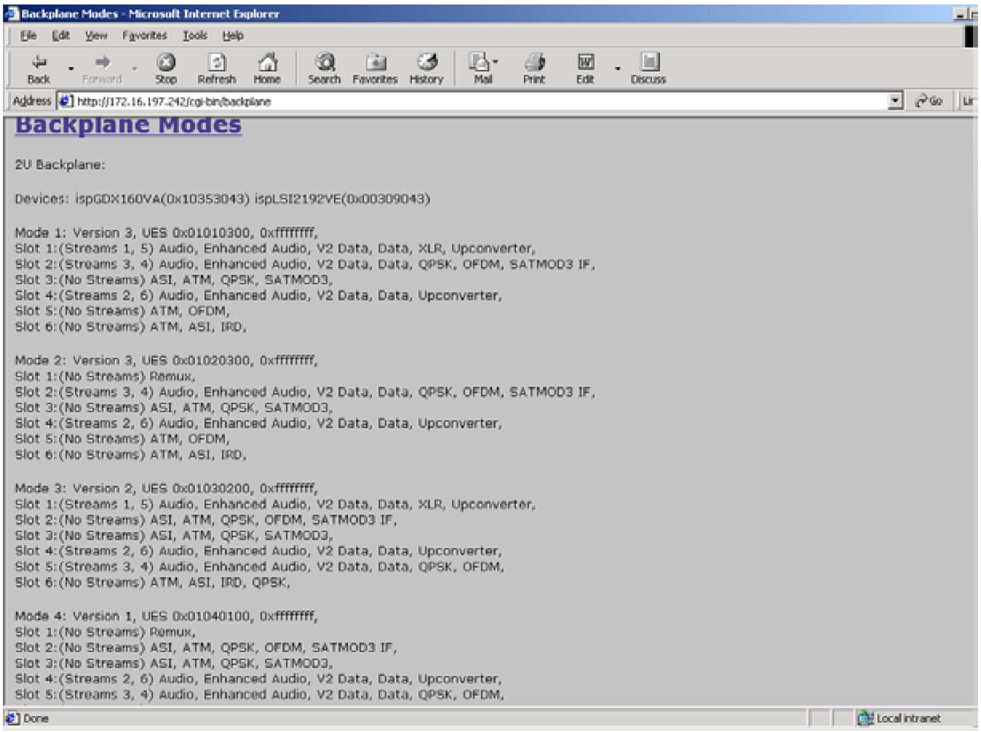


Figure 5.13: Backplane Modes

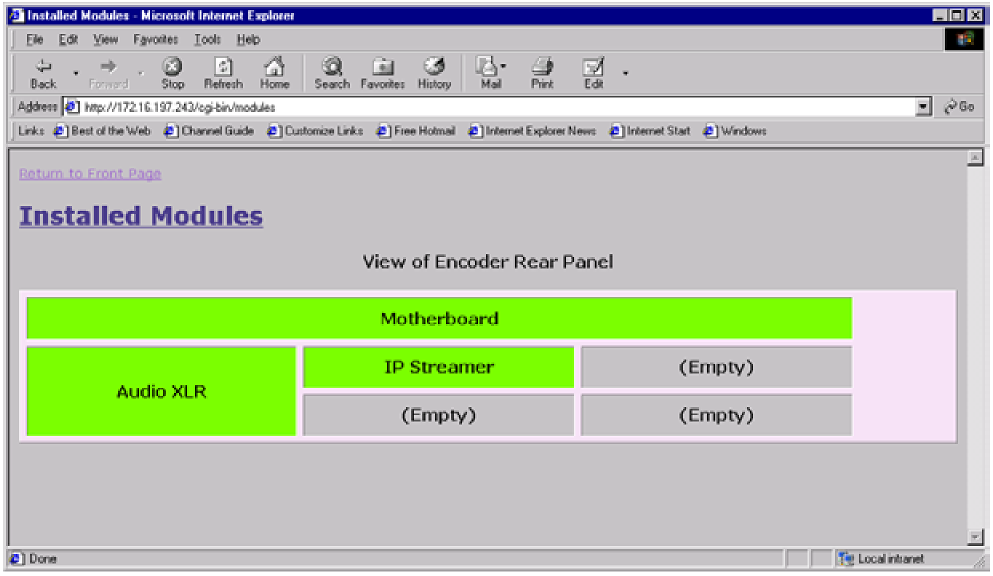


Figure 5.14: Installed Modules

Option 6, **Licenced Features** - shows a list of all the features which are, and can be, enabled when the appropriate licence is purchased.

Option 7, **SNMP MIBs** - this option is password protected. It allows the Simple Network Management Protocol (SNMP) Management Information Base (MIB[2]) files to be downloaded from the Encoder to the PC. The password is available from TANDBERG Television Customer Services under a non-disclosure agreement (NDA).

[2] A definition of management items for some network component that can be accessed by a network manager. A MIB includes the names of objects it contains and the type of information retained.

Option 8, **Encoder Errors** – shows a list of Active Errors, Masked Active Errors and Latched Errors.

Option 9, **Event Log** - shows the events and tests which have been performed since the Encoder was last switched on when **Event Log** or **Non-Volatile Event Log** is clicked.

Option 10, **Fault Reporting** – click **version nos.htm, event log.htm, event nv log.htm** and **Encoder Errors** to display the appropriate file. Save the files to a disk:

- Right-click the hyperlink **version nos.htm, event log.htm, event nv log.htm** and **Encoder Errors**.
- From the shortcut menu click **Save Target As**.
- Select the directory where you want to save the files and click **Save**.
- Send to the files to TANDBERG Television.

Also, send a clone file of the Encoder configuration. See *Section 5.4, Cloning a File* for details.

5.4 Cloning a File

A particularly useful feature of the Encoder is the ability to extract a clone file. This can be sent to TANDBERG Television and used to configure other Encoders to exactly the same specification. It is very useful when trying to reproduce a fault and also for restoring a machine after repair. The file is extracted using TFTP protocol (see *Figure 5.15*).

To extract the file, open a Command Prompt window and type:

tftp –i `IP address of Encoder' get clone

For instance, *tftp –i 172.16.197.245 get clone*

The cloned file will be stored on the PC drive in the same directory that the command prompt is set to.

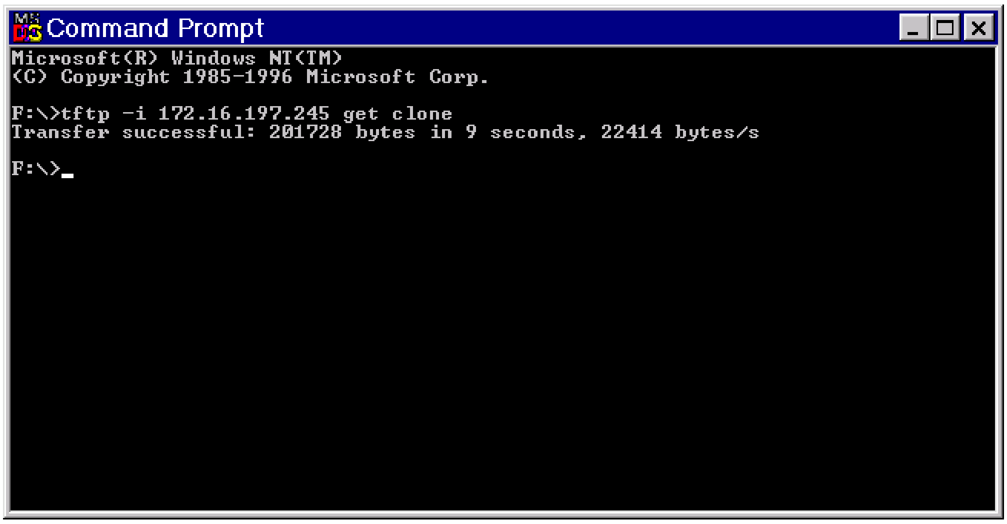


Figure 5.15: TFTP Protocol for Cloning a File

NOTE...

The clone file is read-only and must be deleted or renamed prior to downloading a second clone file on the computer.

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Chapter 6

Preventive Maintenance and Fault-finding

Contents

List of Figures

List of Tables

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6.1 Introduction

This chapter provides the schedules and instructions, where applicable, for routine inspection, cleaning and maintenance of the equipment which should be performed by an operator. There are also some basic fault-finding procedures to follow in the event of a suspected Encoder failure.

6.2 Preventive Maintenance

6.2.1 Routine Inspection - Cooling Fans

The fans on the Encoder can be temperature controlled so may not be on if the ambient temperature is low. Refer to *Annex B, Technical Specification, Table B.27* for more information.

> NOTE...
>
> Failure to ensure a free flow of air around the unit may cause overheating. This condition is detected by a temperature sensor on the Base Board which causes the alarm relay to be energised.

6.2.2 Cleaning

Unplug the Encoder from the wall outlet before cleaning the exterior with a damp cloth. Do not use liquid cleaners or aerosol cleaners.

> NOTE...
>
> Only the exterior of the case should be cleaned.

6.2.3 Servicing

Damage Requiring Service

> WARNING...
>
> DO NOT ATTEMPT TO SERVICE THIS PRODUCT AS OPENING OR REMOVING COVERS MAY EXPOSE DANGEROUS VOLTAGES OR OTHER HAZARDS. REFER ALL SERVICING TO SERVICE PERSONNEL WHO HAVE BEEN AUTHORISED BY TANDBERG TELEVISION.

Unplug the equipment from the wall outlet and refer servicing to qualified service personnel under the following conditions:

1. When the power supply cord or plug is damaged
2. If liquid has been spilled, or objects have fallen into the product
3. If the product has been exposed to rain or water
4. If the product does not operate normally by following the operating instructions
5. If the product has been dropped or the case has been damaged
6. When the product exhibits a distinct change in performance

Replacement Parts

When replacement parts are required, be sure the service technician has used parts specified by the manufacturer or which have the same characteristics as the original part. Unauthorised substitutions may result in fire, electric shock or other hazards.

Checks on Completion of Servicing

Upon completion of any service or repairs to this product, ask the service technician to perform safety checks to determine that the product is in a safe operating condition. Also, performance and EMC checks may be required.

6.3 Maintenance and Support Services

6.3.1 Introduction

TANDBERG Television is a leader in the design, integration and implementation of digital broadcasting products and systems. It has a large team dedicated to keeping our customers on air 24 hours a day, 365 days a year.

With regional offices worldwide, and ultra-modern specialist service facilities in the US, UK, Hong Kong and Australia, TANDBERG Television covers the world. There is a customer service centre open round the clock, every day of the year, in your time zone.

TANDBERG's years of design and support experience enable it to offer a range of service options that will meet your needs at a price that makes sense.

It's called the **TANDBERG Advantage**.

6.3.2 Warranty

All TANDBERG Products and Systems are designed and built to the highest standards and are covered under a comprehensive 12 month warranty.

6.3.3 Levels of Continuing TANDBERG Television Service Support

For stand-alone equipment, then TANDBERG Television **BASIC Advantage** is the value for money choice for you. BASIC provides you with year-by-year Service long after the warranty has expired.

For systems support you can choose either **Gold** or **Silver Advantage**. These packages are designed to save you costs and protect your income through enlisting the help of TANDBERG Television support specialists.

VOYAGER Advantage is the truly mobile service solution. This provides a package specifically designed to keep you mobile and operational.

Call TANDBERG Sales for more details.

6.4 Errors and Diagnostics Menus – When to Use Them

6.4.1 Error Messages

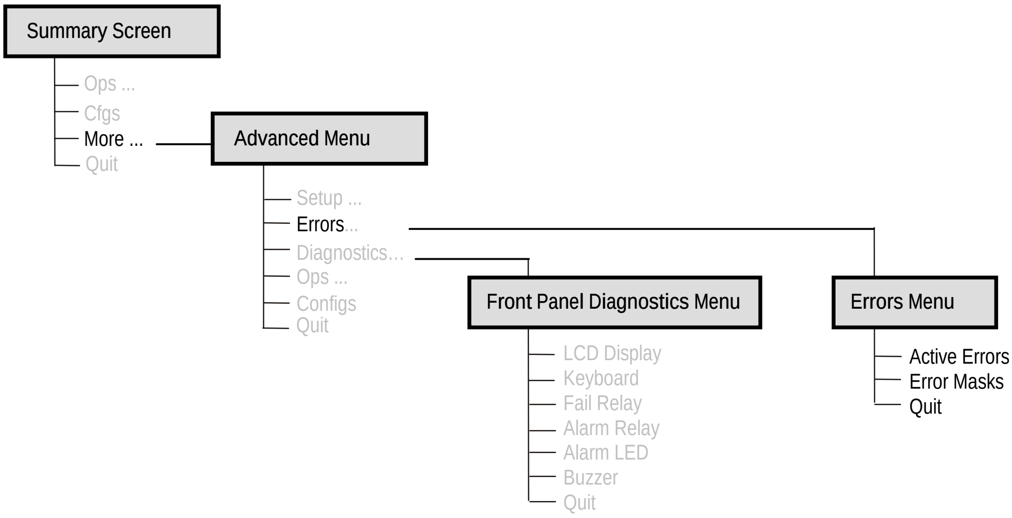


Figure 6.1: Finding the Errors Menu

Investigate any run-time errors by pressing the **Active Errors** softkey in the `Errors Menu` (see *Figure 6.1*). Current errors are displayed.

> NOTES...
> 1. This function can be used with the Encoder still in service.
> 2. If an error reoccurs within approximately 30 seconds then it does not 'interrupt' the front panel display. This avoids swamping the front panel display with error messages should an intermittent error occur.

Refer to *Annex H, Error Messages* for further details of error messages.

> CAUTION...
>
> It does not mean that the Encoder is fully functional if the Error option does not produce any results. Some processes cannot be tested on-line.

6.4.2 Diagnostics Menu

Introduction

The `Diagnostics Menu` is selected from the `Advanced Menu` by pressing the **Diagnostics** softkey. This menu (see *Figure 6.2*) has a selection of diagnostic tests which allow the operator to test the individual component parts of the equipment.

Also, **option 8**, the event log, on the web browser interface (see *Chapter 5, Web Browser Interface*) shows the events and tests which have been performed since the Encoder was last switched on.

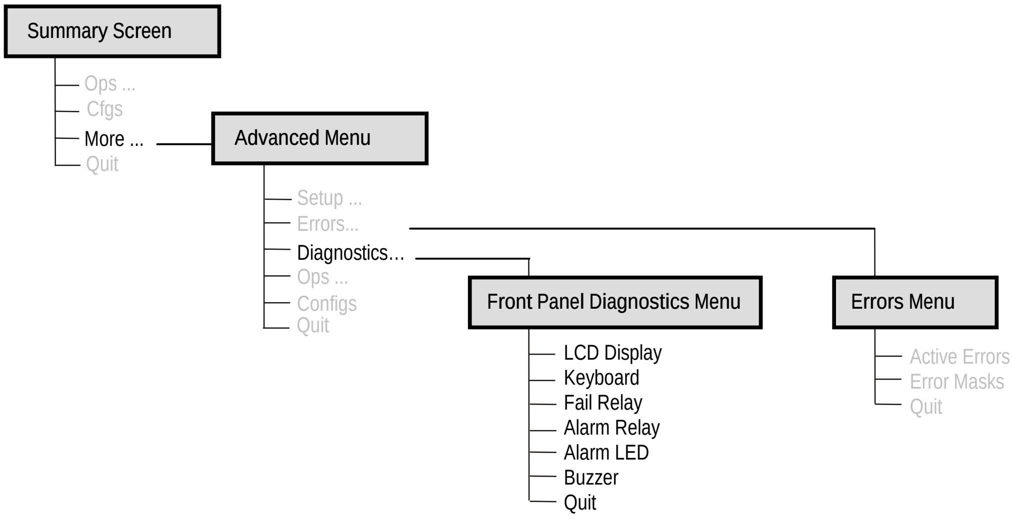


Figure 6.2: Finding the Diagnostics Menu

LCD Display Test

Press the **LCD Display** softkey to access the option and then press any key to cycle through the test patterns and to return to the menu.

Keyboard Test

Press the **Keyboard** softkey to access the option and then press each softkey and keypad key in turn. The display shows the name of each key pressed. Press the **Quit** softkey to return to the menu.

Fail Relay Test

Press the **Fail Relay** softkey to access the option and then press any key (except the **Quit** softkey) to toggle the fail relay on and off. Press the **Quit** softkey to return to the menu. The relay can usually be heard clicking as it changes state. The relay is connected to the rear panel **ALARM** connector – see *Chapter 2*, *Installing the Equipment* for the connector pin-out details.

Alarm Relay Test

Press the **Alarm Relay** softkey to access the option and then press any key (except the **Quit** softkey) to toggle the alarm relay on and off. Press the **Quit** softkey to return to the menu. The relay can usually be heard clicking as it changes state. The relay is connected to the rear panel **ALARM** connector – see *Chapter 2*, *Installing the Equipment* for the connector pin-out details.

Alarm LED Test

Press the **Alarm LED** softkey to access the option and then press any key (except the **Quit** softkey) to toggle the front panel Alarm LED on and off. Press the **Quit** softkey to return to the menu.

Buzzer Test

Press the **Buzzer** softkey to access the option which immediately causes a buzzer to sound. Press any key (except the **Quit** softkey) to turn the buzzer off. Press the **Quit** softkey to return to the menu.

6.5 Fault-finding

6.5.1 Fault-finding Philosophy

It is the objective of this chapter to provide sufficient information to enable the operator to rectify apparent faults or else to identify the suspect module, where possible. Some basic procedures are provide to follow in the event of a suspected Encoder failure. It is assumed that fault-finding has already been performed at a system level and that other equipment units have been eliminated as the possible cause of the failure (see relevant *System Manual*).

WARNING...

DO NOT REMOVE THE COVERS OF THIS EQUIPMENT. HAZARDOUS VOLTAGES ARE PRESENT WITHIN THIS EQUIPMENT AND MAY BE EXPOSED IF THE COVERS ARE REMOVED. ONLY TANDBERG TELEVISION TRAINED AND APPROVED SERVICE ENGINEERS ARE PERMITTED TO SERVICE THIS EQUIPMENT.

CAUTION...

Do not remove the covers of this equipment. Unauthorised maintenance or the use of non-approved replacements may affect the equipment specification and invalidate any warranties.

This manual does not include any maintenance information or procedures which would require the removal of covers.

If the following information fails to clear the abnormal condition, call a Service Engineer or contact Customer Services using the information given in the preliminary pages of this manual.

6.5.2 Preliminary Checks

Always investigate the failure symptoms fully, prior to taking remedial action. Fault diagnosis for the equipment operator is limited to the following tasks, since the operator should **NOT** remove the covers of the equipment:

1. Check the front panel Power LED. If this is not lit:
   a) Replace the fuse in the power connector at the rear panel (see *Section 6.5.3, User Accessible Fuse Replacement*).

NOTE...

Only replace the fuse once. If it blows again contact Customer Services.

   b) Replace external equipment, power source and cables by substitution to check their performance.

2. Confirm that the equipment hardware configuration is suitable for the purpose and has been correctly installed and connected (see *Chapter 2, Installing the Equipment*).
3. Confirm that inappropriate operator action is not causing the problem, and that the equipment software set-up is capable of performing the task being asked of it. If the validity of the configuration, set-up or operation is in doubt, check it (see *Chapter 4, Operating the Encoder Locally*).
4. Check that the fans are unobstructed and working correctly.

When the failure condition has been fully investigated, and the symptoms are known, proceed with fault-finding according to the observed symptoms. If the fault persists, and cannot be rectified using the instructions given in this manual, contact Customer Services. Switch off the equipment if it becomes unusable, or to protect it from further damage.

6.5.3 User Accessible Fuse Replacement

A fuse is held in an integral fuse carrier at the ac power inlet at the rear panel.

> NOTE...
>
> Refer to *Annex B, Section B.5, Power Supply* for more information about the fuse details.

To replace the ac power fuse:

> WARNING...
>
> BEFORE REPLACING THE REAR PANEL FUSE, DISCONNECT THE UNIT FROM THE SUPPLY. FAILURE TO DO THIS MAY EXPOSE HAZARDOUS VOLTAGES. UNPLUG THE UNIT FROM THE LOCAL SUPPLY SOCKET.

1. Ensure that power is turned off and the power cable is disconnected from the ac power inlet.
2. Ease out the fuse carrier by placing a small, flat-bladed screwdriver in the notch at the top of the carrier.

> CAUTION...
>
> When replacing the power input fuse, always ensure that a fuse of the correct type and rating, is fitted. Failure to do so results in inadequate protection.

3. Replace the fuse in the carrier.
4. Insert the fuse carrier back in the ac power inlet.

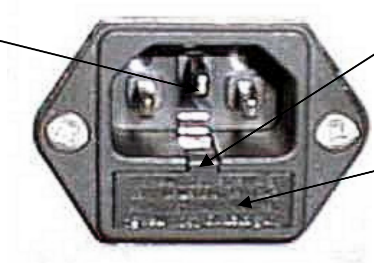


Figure 6.3: Orientation of Fuse Carrier

If the replacement fuse also blows, do not continue. Disconnect the equipment and contact Customer Services for advice.

6.5.4 Video Fault-finding

Fault Symptoms

Table 6.1: Video Fault-finding

Problem	What to do
Video input lock error	Check video input.
Video - wrong line standard	Check which video format is selected.
VCM stopped	Reboot.
Bad parameters	Check set-up.

Breaks in Transmission

If a transitory break in transmission occurs then check the encoding mode option of the Encoder (see *Chapter 4, Operating the Equipment Locally*).

In the standard delay, low delay, very low delay and mega low delay the following are not seamless: encoding modes, bit-rate and GOP changes. This is because the Encoder tries to maintain minimal end-to-end delay (latency) and that means buffer sizes must be as small as possible. In the standard delay, low delay, very low delay and mega low delay encoding modes the buffer size is selected by the video bit-rate. Changing the bit-rate changes the buffer size, requiring a reset of the coding process.

For reflex operation video bit-rate changes must be seamless as the bit-rate varies continuously. All the seamless modes are seamless only for video bit-rate changes. However, for some GOP changes operation can be seamless, but this aspect is not guaranteed.

Noise Reduction

Where incoming picture material is corrupted by high frequency noise (such as white noise) it is advisable to make use of the noise reduction process. Noise reduction can be selected at the front panel.

6.5.5 Audio Fault-finding

If having problems when using the Dolby E Pass-through coding mode then refer to *Annex G, Audio Modes*, for information about using this mode.

6.5.6 Mux Fault-finding

If there is no output from the ASI connectors, check the following:

1. The bit-rate - if it is too low then the video etc. is automatically switched off.
2. The packet length - should be 188 or 204 bytes depending upon configuration.

6.6 Rate Buffer Setting

The E5710/E5720 Encoders, when running in 4:2:2[1] mode, have two software selectable rate buffer modes; small and medium.

When transmitting 4:2:2[1] mode into systems using the earlier System 3000 PRO IRD M2/PSR/3/422BAS then the rate buffer mode of the Encoder must be set to 'small'.

However, when operating into an Alteia the rate buffer mode of the Encoder must be set to ‘medium’ (default size).

When operating in mixed environments, both the Alteia and the Encoder must be changed to small buffer mode.

> NOTE...
> Contact Customer Services for advice about changing the settings (see *Preliminary Pages*).

Table 6.2: Rate Buffer Settings

	E5710/E5720 Setting	Alteia Setting
PRO IRD	SMALL	-
Alteia only	MEDIUM	MEDIUM
Alteia and PRO IRD	SMALL	SMALL

6.7 Field / Frame Pictures

Some Receivers are unable to decode field pictures. Select **Frames** in the **Field / Frame Option**. Does the fault clear? If not, contact Customer Services.

[1] 4:2:2 is only available when software option M2/ESO2/422 is purchased.

6.8 Power Supply Problems/Green LED on Front Panel Unlit

6.8.1 Symptoms

WARNING...

DO NOT ATTEMPT TO SERVICE THE POWER SUPPLY UNIT AS OPENING OR REMOVING COVERS MAY EXPOSE DANGEROUS VOLTAGES OR OTHER HAZARDS. REFER ALL SERVICING TO SERVICE PERSONNEL WHO HAVE BEEN AUTHORISED BY TANDBERG TELEVISION.

Use the following techniques to fault-find the Encoder according to the observed symptom(s) when a power supply failure is suspected.

6.8.2 Power LED Unlit

If the Encoder Power LED is unlit, fault-find the problem as detailed in *Table 6.3*.

Table 6.3: Power LED Unlit Fault-finding

Step	Action	If Result of Action is Yes...	If Result of Action is No...
1	Check the Stand-by Switch. Is the 'I' at the top?	The problem lies within the Encoder.	Rotate the Stand-by Switch so that the 'I' is at the top. If the problem persists proceed to next step.
2	Check Power LED. Is the Encoder still working?	If the Encoder is clearly working normally then the Power LED itself is probably at fault. Call a Service Engineer.	Proceed to next step.
3	Check Power Source. Connect a known-working piece of equipment to the power source outlet. Does it work?	The problem lies within the Encoder or power cable. Proceed to next step.	The problem lies with the power source. Check building circuit breakers, fuse boxes, etc. If problem persists, contact the electricity supplier.
4	Check Power Cable and Fuse. Unplug the power connector from the Encoder and try it in another piece of equipment. Does it work?	The problem lies within the Encoder. Proceed to next step.	The problem lies with either the cable itself, or with the fuse in the plug. Replace the fuse or try to substitute another cable.
5	Check PSU Module and Fuse. Ensure the power connector is unplugged. Remove the fuse from the rear panel connector and inspect it. Has the fuse blown?	Replace the fuse with one of the correct type and rating (see *Annex B Technical Specification)*. If the PSU still does not work, unplug the power cable and call a Service Engineer.	Possible problem with the PSU module. Call a Service Engineer.

6.8.3 Fan(s) Not Working/Overheating

The fans can be disabled at low temperatures to allow the unit to quickly attain operational temperature. In the event of overheating problems, refer to *Table 6.4*.

NOTE...

Failure to ensure a free air flow around the unit may cause overheating. This condition is detected by a temperature sensor on the Base Board which may be used to trigger an automatic alarm.

Table 6.4: Fans Not Working/Overheating

Step	Action	If Result of Action is Yes...	If Result of Action is No...
1	Check Fan Rotation. Inspect the fans located at the sides of the enclosure. Are the fans rotating? Check Base Board temperature and fan (see the `Build Menu` in *Figure 4.9*).	Check that the Encoder has been installed with sufficient space allowed for air flow (see *Chapter 2, Installing the Equipment*). If the ambient air is too hot, additional cooling may be required.	Possible break in the dc supply from the PSU module to the suspect fan(s). Call a Service Engineer.

6.9 Disposing of This Equipment

6.9.1 General

Dispose of this equipment safely at the end of its life. Local codes and/or environmental restrictions may affect its disposal. Regulations, policies and/or environmental restrictions differ throughout the world. Contact your local jurisdiction or local authority for specific advice on disposal.

6.9.2 Lithium Batteries

The equipment uses the Dallas Semiconductor NVRAM DS1746WP which contains a Dallas DS9034PCX Power Cap Lithium battery. This cell is not a USA Environmental Protection Agency listed hazardous waste. It is fully encapsulated and should not be tampered with.

Annex A

Glossary

The following list covers most of the abbreviations, acronyms and terms as used in TANDBERG Television Limited Manuals. All terms may not be included in this manual.

µm	Micrometre (former name - micron): a unit of length equal to one millionth (10^{-6}) of a metre.
3:2 pulldown	A technique used when converting film material (which operates at 24 pictures per second) to 525-line video (operating at 30 pictures per second).
4:2:0	Digital video coding method in which the colour difference signals are sampled on alternate lines at half the luminance rate.
4:2:2	Digital video coding method in which the colour difference signals are sampled on all lines at half the luminance rate.
422P@ML	422 Profile at Main Level: A subset of the MPEG-2 standard, which supports digital video storage (DVD etc.) and transmissions up to 50 Mbit/s over various mediums. Used for Contribution and Distribution applications.
5B6B	5 Binary Bits Encoded to 6 Binary Bits: Block code.
AC-3	Audio Coding algorithm number 3 (See Dolby Digital).
ACC	Authorisation Control Computer.
ADPCM	Adaptive Differential Pulse Code Modulation: An advanced PCM technique that reduces the bit-rate by coding the difference values between successive samples rather than the absolute value of each sample.
ADT	Audio, Data And Teletext.
AFC	Automatic Frequency Control.
AFS	Automation File Server.
AGC	Automatic Gain Control.
AMOL I and II	Automatic Measure of Line-ups I and II: Used by automated equipment to measure programme-viewing ratings.
ASI	Asynchronous Serial Interface.
ASIC	Application-Specific Integrated Circuit: A customised chip designed to perform a specific function.
Async	Asynchronous.
ATM	Asynchronous Transfer Mode: A connection orientated, cell based, data transport technology designed for Broadband ISDN (B-ISDN). It provides a circuit-switched bandwidth-on-demand carrier system, with the flexibility of packet switching. It offers low end-to-end delays and (negotiable on call set-up) Quality of Service guarantees. Asynchronous refers to the sporadic nature of the data being transmitted. Cells are transmitted only when data is to be sent; therefore the time interval between cells varies according to the availability of data.
ATSC	Advanced Television Standards Committee: An organisation founded in 1983 to research and develop a digital TV standard for the U.S.A. In late 1996, the FCC adopted the ATSC standard, the digital counterpart of the NTSC standard.

B3ZS	Bipolar with Three Zero Substitution: A method of eliminating long zero strings in a transmission. It is used to ensure a sufficient number of transitions to maintain system synchronisation when the user data stream contains an insufficient number of 1s to do so. B3ZS is the North American equivalent of the European HDB3.
Backward Compatibility	Refers to hardware or software that is compatible with earlier versions.
BAT	Bouquet Association Table: Part of the service information data. The BAT provides information about bouquets. It gives the name of the bouquet and a list of associated services.
baud rate	The rate of transfer of digital data when the data comprises information symbols that may consist of a number of possible states. Equivalent to bit-rate when the symbols only have two states (1 and 0). Measured in Baud.
BER	Bit Error Rate: A measure of transmission quality. The rate at which errors occur in the transmission of data bits over a link. It is generally shown as a negative exponent, (e.g. 10^{-7} means that 1 in 10,000,000 bits are in error).
BISS	Basic Interoperable Scrambling System: Non-proprietary encryption from EBU (Tech3290).
Bit-rate	The rate of transfer of digital data when the data comprises two logic states, 1 and 0. Measured in bit/s.
Block; Pixel Block	An 8-row by 8-column matrix of luminance sample values, or 64 DCT coefficients (source, quantised, or dequantised).
Bouquet	A collection of services (TV, radio, and data, or any combination of the three) grouped and sold together, and identified in the SI as a group. A single service may be in several bouquets.
B-Picture; B-Frame	Bi-directionally Predictive Coded Picture/Frame: A picture that is coded using motion-compensated prediction from previous I or P frames (forward prediction) and/or future I or P frames (backward prediction). B frames are not used in any prediction.
BPSK	Binary Phase Shift Keying: A data modulation technique.
Buffer	A memory store used to provide a consistent rate of data flow.
BW	Bandwidth: The transmission capacity of an electronic line such as (among others) a communications network, computer bus, or broadcast link. It is expressed in bits per second, bytes per second or in Hertz (cycles per second). When expressed in Hertz, the frequency may be a greater number than the actual bits per second, because the bandwidth is the difference between the lowest and highest frequencies transmitted. High bandwidth allows fast transmission or high-volume transmission.
Byte-mode	Each byte is delivered separately in the ASI Transport Stream, with stuffing data added between the Bytes to increase the data rate to 270 Mbit/s. See DVB Document A010 rev. 1, Section B3.3, (ASI) Layer-2 Transport Protocol.
CA	Conditional Access: The technology used to control the access to viewing services to authorised subscribers through the transmission of encrypted signals and the programmable regulation of their decryption by a system such as viewing cards.
CAT	Conditional Access Table: Part of the MPEG-2 Program Specific Information (PSI) data. Mandatory for MPEG-2 compliance if CA is in use.
C-Band	The portion of the electromagnetic spectrum, which spans the frequency range of approximately 4 GHz to 6 GHz. Used by communications satellites. Preferred in tropical climates because it is not susceptible to fading.
CCIR	*See:* ITU-R.
CCITT	*See:* ITU-T.
Channel	A narrow range of frequencies, part of a frequency band, for the transmission of radio and television signals without interference from other channels. In the case of OFDM, a large number of carriers spaced apart at precise frequencies are allocated to a channel.
Channel Coding	A way of encoding data in a communications channel that adds patterns of redundancy into the transmission path in order to improve the error rate. Such methods are widely used in wireless communications.
Chrominance	The colour part of a TV picture signal, relating to the hue and saturation but not to the luminance (brightness) of the signal. In a composite-coded colour system, the colour information (chrominance, often referred to as chroma) is modulated onto a high frequency carrier and added to the monochrome-format video signal carrying the luminance (Y). In a component-coded colour system, the two colour-difference signals (R-Y)(B-Y) usually referred to as C_RC_B (digital) or P_RP_B (analogue), are used to convey colour information. When C_RC_B (P_RP_B) is added to the luminance (Y), the complete picture information is conveyed as YC_RC_B (YP_RP_B).
Closed Captioning	A TV picture subtitling system used with 525-line analogue transmissions.
CODE	Create Once Distribute Everywhere.
Codec	The combination of an Encoder and a complementary Decoder located respectively at the input and output of a transmission path.
COFDM	Coded OFDM: COFDM adds forward error correction to the OFDM transmission consisting of Reed-Solomon (RS) coding followed by convolutional coding to add extra bits to the transmitted signal. This allows a large number of errors at the receive end to be corrected by convolutional (Viterbi) decoding followed by RS decoding.

Compression	Reduction in the number of bits used to represent the same information. For the purposes of a broadcast system, it is the process of reducing digital picture information by discarding redundant portions of information that are not required when reconstituting the picture to produce viewing clarity. Compression allows a higher bite-rate to be transmitted through a given bandwidth.
Compression System	Responsible for compressing and multiplexing the video / audio / data bit-streams, together with the authorisation stream. The multiplexed data stream is then ready for transmission.
C_RC_B	Digital Colour difference signals. These signals, in combination with the luminance signal (Y), define the colour and brightness of each picture element (pixel) on a TV line. *See:* Chrominance
CRC	Cyclic Redundancy Check: A mathematical algorithm that computes a numerical value based on the bits in a block of data. This number is transmitted with the data and the receiver uses this information and the same algorithm to ensure the accurate delivery of data by comparing the results of algorithm and the number received. If a mismatch occurs, an error in transmission is presumed.
CVCT	Cable Virtual Channel Table (ATSC).
dB	Decibels: A ratio of one quantity to another using logarithmic scales to give results related to human aural or visual perception. dB is a ratio whereas dBm, for example, is an absolute value, quoted as a ratio to a fixed point of 0 dBm. 0 dBm is 1 mW at 1 kHz terminated in 600Ω. 0 dBmV is 1 mV terminated in 75Ω.
DCE	Data Communications Equipment: Typically a modem. It establishes, maintains and terminates a session on a network but in itself is not the source (originator) or destination (end receiving unit) of signals (e.g. a computer, see DTE). A DCE device may also convert signals to comply with the transmission path (network) format.
DCT	Discrete Cosine Transform: A technique for expressing a waveform as a weighted sum of cosines. Raw video data is not readily compressible. DCT is not in itself a compression technique but is used to process the video data so that it is compressible by an encoder. DCT processes the picture on an 8x8-pixel block basis, converting the data from an uncompressible X Y form (as displayed by an oscilloscope) to a compressible frequency domain form (as displayed by a spectrum analyser). Can be forward DCT or inverse DCT.
DDS	Direct Digital Synthesiser.
Decoder	The unit containing the electronic circuitry necessary to decode encrypted signals. Some Decoders are separate from the receiver but in satellite TV broadcasting, the term is often used interchangeably as a name for an Integrated Receiver Decoder (IRD). The term IRD, or IRD / Decoder, is usually associated with satellite TV broadcasting while Cable systems are based on Converters or on Set-Top Boxes / Converters.
Decoding Time-stamp	A field that may be present in a PES packet header that indicates the time that an access unit is to be decoded in the system target Decoder.
DID	Data Identifier.
Differential Coding	Method of coding using the difference between the value of a sample and a predicted value.
DIL	Dual In Line: The most common type of package for small and medium scale integrated circuits. The pins hang vertically from the two long sides of the rectangular package, spaced at intervals of 0.1 inch.
DIN	Deutsches Institut für Normung: German Standards Institute.
Dolby Digital	Formerly AC-3. An audio coding system based on transform coding techniques and psychoacoustic principles.
Downlink	The part of the satellite communications circuit that extends from the satellite to an Earth station.
Downconvert	The process by which the frequency of a broadcast transport stream is shifted to a lower frequency range.
DPCM	Differential Pulse Code Modulation: An audio digitisation technique that codes the difference between samples rather than coding an absolute measurement at each sample point.
DSNG	Digital Satellite News-Gathering.
DSP	Digital Signal Processor.
DTE	Data circuit Terminating Equipment: A communications device that originates (is the source) or is the end receiving unit (destination) of signals on a network. It is typically a terminal or computer.
DTH	Direct To Home. The term used to describe uninterrupted transmission from the satellite directly to the subscriber, that is, no intermediary cable or terrestrial network utilised.
DTS	Digital Theater Systems: A motion picture digital sound system.
DVB	Digital Video Broadcasting: A European project which has defined transmission standards for digital broadcasting systems using satellite (DVB-S), cable (DVB-C) and terrestrial (DVB-T) medium, created by the EP-DVB group and approved by the ITU. Specifies modulation, error correction, etc. (see EN 300 421 for satellite, EN 300 429 for cable and EN 300 744 for terrestrial).
DVB SI	Digital Video Broadcasting Service Information.
DVB-PI	DVB-Professional Interfaces: TTV Lan search shows – DVB Physical Interfaces

Earth	Technical Earth: Ensures that all equipment chassis within a rack are at the same potential, usually by connecting a wire between the Technical earth terminal and a suitable point on the rack. This is sometimes known as a Functional earth. Protective Earth: Used for electric shock protection. This is sometimes known as a safety earth.
EBU	European Broadcast Union.
ECM	Entitlement Control Message.
EDI	Ethernet Data Input
EIA	Electronics Industries Association (USA).
EIT	Event Information Table: Equipment: A component of the DVB-Service Information (SI) stream generated within an Encoder, containing information about events or programmes such as event name, start time, duration, etc. System: EIT (Present/Following) contains the name of the current and next event. It may include an optional descriptor (synopsis) giving brief details of content. EIT (Schedule) is used to produce a full EPG. The EIT is the only DVB-SI table, which can be encrypted.
Elementary Stream	A generic term for a coded bit-stream, be it video, audio or other.
EMC	Electromagnetic Compatibility.
EMM	Entitlement Management Message.
Encryption	Encoding of a transmission to prevent access without the appropriate decryption equipment and authorisation.
EPG	Electronic Programme Guide: On-screen programme listing using thumbnail pictures and/or text.
Ethernet	The most widely used local area network (LAN) defined by the IEEE as the 802.3 standard. Transmission speeds vary according to the configuration. Ethernet uses copper or fibre-optic cables.
ETS	European Telecommunications Standard.
ETSI	European Telecommunications Standards Institute.
FCC	Federal Communications Commission.
FDM	Frequency Division Multiplex: A common communication channel for a number of signals, each with its own allotted frequency.
FEC	Forward Error Correction: A method of catching errors in a transmission. The data is processed through an algorithm that adds extra bits and sends these with the transmitted data. The extra bits are then used at the receiving end to check the accuracy of the transmission and correct any errors.
FFT	Fast Fourier Transformation: A fast algorithm for performing a discrete Fourier transform.
FIFO	First In, First Out: A data structure or hardware buffer from which items are taken out in the same order they were put in. Also known as a shelf from the analogy with pushing items onto one end of a shelf so that they fall off the other. A FIFO is useful for buffering a stream of data between a sender and receiver that are not synchronised - i.e. they not sending and receiving at exactly the same rate.
Footprint	The area of the Earth's surface covered by a satellite's downlink transmission. Also (generally) the area from which the satellite can receive uplink transmissions.
FTP	File Transfer Protocol: A protocol used to transfer files over a TCP/IP network (Internet, UNIX, etc.). For example, after developing the HTML pages for a Web site on a local machine, they are typically uploaded to the Web server, using FTP. Unlike e-mail programs in which graphics and program files have to be attached, FTP is designed to handle binary files directly and does not add the overhead of encoding and decoding the data.
G.703	The ITU-T standard which defines the physical and electrical characteristics of hierarchical digital interfaces.
GOP	Group of Pictures: MPEG video compression works more effectively by processing a number of video frames as a block. The TANDBERG Television Encoder normally uses a 12 frame GOP; every twelfth frame is an I frame.
GUI	Graphical User Interface: The use of pictures rather than just words to represent the input and output of a program. A program with a GUI runs under a windowing system and has a screen interface capable of displaying graphics in the form of icons, drop-down menus and a movable pointer. The on-screen information is usually controlled / manipulated by a mouse or keyboard.
HDTV	High Definition Television.
HPA	High Power Amplifier: Used in the signal path to amplify the modulated and up-converted broadcast signal for feeding to the uplink antenna.
HSYNC	Horizontal (line) SYNCs.
Hub	A device in a multipoint network at which branch nodes interconnect.
ICAM	Integrated Conditional Access Module: Embedded in the IRD and responsible for descrambling, plus packet filtering and reception. It also contains the physical interface to the subscriber's viewing card.
IEC	International Electrotechnical Committee.

IF	Intermediate Frequency: Usually refers to the 70 MHz or 140 MHz output of the Modulator in cable, satellite and terrestrial transmission applications.
Interframe Coding	Compression coding involving consecutive frames. When consecutive frames are compared, temporal redundancy is used to remove common elements (information) and arrive at difference information. MPEG-2 uses B and P frames, but since they are individually incomplete and relate to other adjacent frames, they cannot be edited independently.
Intraframe Coding	Compression coding involving a single frame. Redundant information is removed on a per frame basis. All other frames are ignored. Coding of a macroblock or picture that uses information only from that macroblock or picture. Exploits spatial redundancy by using DCT to produce I frames; these are independent frames and can be edited.
IP	Internet Protocol: The IP part of TCP/IP. IP implements the network layer (layer 3) of the protocol, which contains a network address and is used to route a message to a different network or sub-network. IP accepts packets from the layer 4 transport protocol (TCP or UDP), adds its own header to it and delivers a datagram to the layer 2 data link protocol. It may also break the packet into fragments to support the Maximum Transmission / Transfer Unit (MTU) of the network.
I-picture; I-frame	Intracoded Picture/Frame: A picture / frame, which is coded using purely intracoding with reference to no other field or frame information. The I frame is used as a reference for other compression methods.
IPPV	Impulse Pay Per View: One-time events, purchased at home (on impulse) using a prearranged SMS credit line.
IRD	Integrated Receiver Decoder: The Receiver with an internal MPEG Decoder, which is connected to the subscriber's TV. The IRD is responsible for receiving and de-multiplexing all signals. The unit receives the incoming signal and if CA is active, decodes the signal when provided with a control word by the viewing card. Domestic IRDs are also known as Set-Top Units or Set-Top Boxes.
IRE	Institute of Radio Engineers: No longer in existence but the name lives on as a unit of video amplitude measurement. This unit is 1% of the range between blanking a peak white for a standard amplitude signal.
ISDN	Integrated Services Digital Network: The basic ISDN service is BRI (Basic Rate Interface), which is made up of two 64 kbit/s B channels and one 16 kbit/s D channel (2B+D). If both channels are combined into one, called bonding, the total data rate becomes 128 kbit/s and is four and a half times the bandwidth of a V.34 modem (28.8 kbit/s). The ISDN high-speed service is PRI (Primary Rate Interface). It provides 23 B channels and one 64 kbit/s D channel (23B+D), which is equivalent to the 24 channels of a T1 line. When several channels are bonded together, high data rates can be achieved. For example, it is common to bond six channels for quality videoconferencing at 384 kbit/s. In Europe, PRI includes 30 B channels and one D channel, equivalent to an E1 line.
ISO	International Standards Organisation.
ISOG	Inter-union Satellite Operations Group.
ITS	Insertion Test Signal: A suite of analogue test signals placed on lines in the VBI. Also known as VITS.
ITT	Invitation To Tender.
ITU-R	International Telecommunications Union - Radiocommunications Study Groups (was CCIR).
ITU-T	International Telecommunications Union - Telecommunications Standardisation Sector (was CCITT).
JPEG	Joint Photographic Experts Group: ISO/ITU standard for compressing still images. It has a high compression capability. Using discrete cosine transform, it provides user specified compression ratios up to around 100:1 (there is a trade-off between image quality and file size).
kbit/s	1000 bits per second.
Kbit	1024 bits, usually refers to memory capacity or allocation.
Ku-band	The portion of the electromagnetic spectrum, which spans the frequency range of approximately 12 GHz to 14 GHz. Used by communications satellites. Preferred for DTH applications because this range of frequency is less susceptible to interference.
LAN	Local Area Network: A network, which provides facilities for communications within a defined building or group of buildings in close proximity.
L-band	The frequency band from 950 MHz to 2150 MHz, which is the normal input-frequency-range of a domestic IRD. The incoming signal from the satellite is down-converted to L-band by the LNB.
LED	Light Emitting Diode.
LNB	Low Noise Block Down-Converter: The component of a subscriber satellite transmission receiving dish which amplifies the incoming signal and down-converts it to a suitable frequency to input to the IRD (typically 950 MHz - 1600 MHz).
LO	Local Oscillator.
LSB	Least significant bit.
Luminance	The television signal representing brightness, or the amount of light at any point in a picture. The Y in YC_RC_B.

LVDS	Low Voltage Differential Signal: LVDS is a generic multi-purpose Interface standard for high speed / low power data transmission. It was standardised in ANSI/TIA/EIA-644-1995 Standard (aka RS-644).
Macroblock	A 16x16-pixel area of the TV picture. Most processing within the MPEG domain takes place with macro blocks. These are converted to four 8x8 blocks using either frame DCT or field DCT. Four 8 x 8 blocks of luminance data and two (4:2:0 chrominance format), four (4:2:2) or eight (4:4:4) corresponding 8 x 8 blocks of chrominance data coming from a 16 x 16 section of the luminance component of the picture. Macroblock can be used to refer to the sample data and to the coded representation of the sample values and other data elements.
Mbit/s	Million bits per second.
MCC	Multiplex Control Computer: A component of a System 3000 compression system. The MCC sets up the configuration for the System 3000 Multiplexers under its control. The MCC controls both the main and backup Multiplexer for each transport stream.
MCPC	Multiple Channels Per Carrier.
MEM	Multiplex Element Manager: A GUI based control system, part of the range of TANDBERG Television compression system control element products. The evolution 5000 MEM holds a model of the system hardware. Using this model, it controls the individual system elements to configure the output multiplexes from the incoming elementary streams. The MEM monitors the equipment status and controls any redundancy switching.
MMDS	Multichannel Microwave Distribution System: A terrestrial microwave direct-to-home broadcast transmission system.
Motion Compensation	The use of motion vectors to improve the efficiency of the prediction of sample values. The prediction uses motion vectors to provide offsets into the past and/or future reference frames or fields containing previously decoded sample values that are used to form the prediction error signal.
Motion Estimation	The process of estimating motion vectors in the encoding process.
Motion Vector	A two-dimensional vector used for motion compensation that provides an offset from the co-ordinate position in the current picture or field to the co-ordinates in a reference frame or field.
MP@ML	Main Profile at Main Level: A subset of the MPEG-2 standard, which supports digital video storage (DVD etc.) and transmissions up to 15 Mbit/s over various mediums.
MP@HL	Main Profile at High Level: A subset of the MPEG-2 standard, which supports digital video storage (DVD etc.) and transmissions up to 80 Mbit/s over various mediums.
MPEG	Moving Pictures Experts Group: The name of the ISO/IEC working group, which sets up the international standards for digital television source coding.
MPEG-2	Industry standard for video and audio source coding using compression and multiplexing techniques to minimise video signal bit-rate in preparation for broadcasting. Specified in ISO/IEC 13818. The standard is split into layers and profiles defining bit-rates and picture resolutions.
MSB	Most significant bit.
Msymbol/s	(Msym/s) Mega (million) Symbols per second (10^6 Symbols per second).
Multiplex	A number of discrete data streams (typically 8 to 12), from encoders, that are compressed together in a single DVB compliant transport stream for delivery to a Modulator.
MUSICAM	Masking pattern adapted Universal Sub-band Integrated Coding And Multiplexing: An audio bit-rate reduction system relying on sub-band coding and psychoacoustic masking.
Mux	Multiplexer: Transmission Multiplexer: receives EMMs from the ACC, ECMs from the BCC, video/audio data from the encoders, and the SI stream from the SIC. It then multiplexes them all into a single DVB-compliant transport stream, and delivers the signal to the uplink after modulation. The Multiplexer also contains the cypher card, which scrambles the services according to the control words supplied by the BCC.
Network	In the context of broadcasting: a collection of MPEG-2 transport stream multiplexes transmitted on a single delivery system, for example, all digital channels on a specific cable system.
NICAM	Near Instantaneously Companded Audio Multiplex: Official name is NICAM 728. Used for digital stereo sound broadcasting in the UK employing compression techniques to deliver very near CD quality audio. 728 refers to the bit-rate in kbit/s.
NIT	Network Information Table: Part of the service information data. The NIT provides information about the physical organisation of each transport stream multiplex, and the characteristics of the network itself (such as the actual frequencies and modulation being used).
nm	Nanometre: a unit of length equal to one thousand millionth (10^{-9}) of a metre.
NTSC	National Television Systems Committee: The group, which developed analogue standards used in television broadcast systems in the United States. Also adopted in other countries (e.g. Mexico, Canada, Japan). This system uses 525 picture lines and a 59.97 Hz field frequency.

NVOD	Near Video On Demand: Method of offering multiple showings of movies or events. The showings are timed to start at set intervals, determined by the broadcaster. Each showing of a movie or event can be sold to subscribers separately.
NVRAM	Non-volatile Random Access Memory: Memory devices (permitting random read / write access) that do not lose their information when power is removed. Stores the default configuration parameters set by the user.
OFDM	Orthogonal FDM: A modulation technique used for digital TV transmission in Europe, Japan and Australia; more spectrally efficient than FDM. In OFDM, data is distributed over a large number of carriers spaced apart at precise frequencies. The carriers are arranged with overlapping sidebands in such a way that the signals can be received without adjacent channel interference.
OPPV	Order ahead Pay Per View: An advance purchase of encrypted one-time events with an expiry date.
OSD	On-screen display: Messages and graphics, typically originating from the SMS, and displayed on the subscriber's TV screen by the IRD, to inform the subscriber of problems or instruct the subscriber to contact the SMS.
Packet	A unit of data transmitted over a packet-switching network. A packet consists of a header followed by a number of contiguous bytes from an elementary data stream.
PAL	Phase Alternating Line: A colour TV broadcasting system where the phase of the R-Y colour-difference signal is inverted on every alternate line to average out errors providing consistent colour reproduction.
PAT	Program Association Table: Part of the MPEG-2 Program Specific Information (PSI) data and is mandatory for MPEG-2 compliance. The PAT points (maps) to the PMT.
PCM	Pulse Code Modulation: A process in which a signal is sampled, each sample is quantised independently of other samples, and the resulting succession of quantised values is encoded into a digital signal.
PCR	Program Clock Reference: A time-stamp in the transport stream from which the Decoder timing is derived.
PDC	Programme Delivery Control (VBI): A Teletext service allowing simple programming (i.e. VideoPlus) of VCR recording times. If the desired program is rescheduled, PDC updates the programming information in the VCR.
Pel	Picture Element: Also known as a pixel. The smallest resolvable rectangular area of an image either on a screen or stored in memory. On screen, pixels are made up of one or more dots of colour. Monochrome and grey-scale systems use one dot per pixel. For grey-scale, the pixel is energised with different intensities, creating a range from dark to light (a scale of 0-255 for an eight-bit pixel). Colour systems use a red, green and blue dot per pixel, each of which is energised to different intensities, creating a range of colours perceived as the mixture of these dots. If all three dots are dark, the result is black. If all three dots are bright, the result is white.
PES	Packetised Elementary Stream: A sequential stream of data bytes that has been converted from original elementary streams of audio and video access units and transported as packets. Each PES packet consists of a header and a payload of variable length and subject to a maximum of 64 kbytes. A time-stamp is provided by the MPEG-2 systems layer to ensure correct synchronisation between related elementary streams at the Decoder.
PID	Packet Identifier: The header on a packet in an elementary data stream, which identifies that data stream. An MPEG-2 / DVB standard.
PIN	Personal Identification Number: A password used to control access to programming and to set purchase limits. Each subscriber household can activate several PINs and may use them to set individual parental rating or spending limits for each family member.
Pixel	PIX (picture) Element: The digital representation of the smallest area of a television picture capable of being delineated by the bit-stream. See Pel for more information.
pk-pk	peak to peak: Measurement of a signal or waveform from its most negative point to its most positive point.
PLL	Phase-Locked Loop. A phase-locked loop is a control system which controls the rotation of an object by comparing its rotational position (phase) with another rotating object as in the case of a sine wave or other repeating signal. This type of control system can synchronise not only the speed, but also the angular position of two waveforms that are not derived from the same source.
PMT	Program Map Table: Part of the MPEG-2 Program Specific Information (PSI) data and is mandatory for MPEG-2 compliance. Each service has a PMT, which lists the component parts (elementary streams of video, audio, etc.) for the various services being transmitted.
P-picture/P-frame	A picture / frame produced using forward prediction. It contains predictions from either previous I frames or previous P frames. The P frame is used as a reference for future P or B frames.
ppm	Parts per million.
PPV	Pay Per View: A system of payment for viewing services based on a usage / event basis rather than on on-going subscription. Subscribers must purchase viewing rights for each PPV event that they wish to view. PPV events may be purchased as IPPV or OPPV.
Program	PC - A sequence of instructions for a computer. TV - A concept having a precise definition within ISO 13818-1 (MPEG-2). For a transport stream, the timebase is defined by the PCR. The use of the PCR for timing information creates a virtual channel within the stream.

Programme	A linking of one or more events under the control of a broadcaster. For example, football match, news, film show. In the MPEG-2 concept, the collection of elementary streams comprising the programme, have a common start and end time. A series of programmes are referred to as events.
P_RP_B	Analogue Colour difference signals. Refer to C_RC_B for an explanation.
PROM	Programmable Read-Only Memory: A device, which may be written once with data for permanent storage, and then read whenever required. Special types of PROM permit the erasure of all data by Ultraviolet light (EPROM) or by application of an electronic signal (EEPROM).
PS	Program Stream: A combination of one or more PESs with a common timebase.
PSI	Program Specific Information: Consists of normative data, which is necessary for the demultiplexing of transport streams and the successful regeneration of programs. (*See also:* SI).
PSIP	Program System Information Protocol: The ATSC equivalent of SI for DVB.
PSK	Phase Shift Keying: A method of modulating digital signals particularly suited to satellite transmission.
PSR	Professional Satellite Receiver: *See also:* IRD.
PSU	Power Supply Unit.
PTS	Presentation Time Stamp (ATSC).
QAM	Quadrature Amplitude Modulation: A method of modulating digital signals, which uses combined techniques of phase modulation and amplitude modulation. It is particularly suited to cable networks.
QPSK	Quadrature Phase Shift Keying: A form of phase shift keying modulation using four states.
QSIF	Quarter Screen Image Format.
Quantise	A process of converting analogue waveforms to digital information. 8-bit quantisation as set out in ITU-R Rec. 601. uses 256 levels in the range 0 – 255 to determine the analogue waveform value at any given point. The value is then converted to a digital number for processing in the digital domain.
RAM	Random Access Memory: A volatile storage device for digital data. Data may be written to, or read from, the device as often as required. When power is removed, the data it contains is lost.
RAS	Remote Authorization System: A TANDBERG TV proprietary public-key encryption system used to prevent unauthorized viewing of a TV programme or programmes.
RF	Radio Frequency.
ROM	Read Only Memory: A non-volatile storage device for digital data. Data has been stored permanently in this device. No further information may be stored (written) there and the data it holds cannot be erased. Data may be read as often as required.
RS	Reed-Solomon coding: An error detection and correction, coding system. 16 bytes of Reed-Solomon Forward Error Correction code are appended to the packet before transmission, bringing the packet length to 204 bytes. The 16 bytes are used at the receiving end to correct any errors. Up to eight corrupted bytes can be corrected.
RLC	Run Length Coding: Minimisation of the length of a bit-stream by replacing repeated characters with an instruction of the form 'repeat character *x y* times'.
SCPC	Single Channel Per Carrier.
Spectral Scrambling	A process (in digital transmission) used to combine a digital signal with a pseudo-random sequence, producing a randomised digital signal that conveys the original information in a form optimised for a broadcast channel.
Scrambling	Alteration of the characteristics of a television signal in order to prevent unauthorised reception of the information in clear form.
SDI	Serial Digital Interface.
SDT	Service Description Table: Provides information in the SI stream about the services in the system; for example, the name of the service, the service provider, etc.
SELV	Safety Extra Low Voltage (EN 60950).
STB	Set-Top Box: A box that sits on top of a television set and is the interface between the home television and the cable TV company. New technologies evolving for set-top boxes are video-on-demand, video games, educational services, database searches, and home shopping. The cable equivalent of the IRD.
STT	System Time Table (ATSC).
SFN	Single Frequency Network: The SFN technique allows large geographic areas to be served with a common transmission multiplex. All transmitters in the network are synchronously modulated with the same signal and they all radiate on the same frequency. Due to the multi-path capability of the multi-carrier transmission system (COFDM), signals from several transmitters arriving at a receiving antenna may contribute constructively to the total wanted signal. The SFN technique is not only frequency efficient but also power efficient because fades in the field strength of one transmitter may be filled by another transmitter.

SI	Service Information: Digital information describing the delivery system, content and scheduling (timing) of broadcast data streams. DVB-SI data provides information to enable the IRD to automatically demultiplex and decode the various streams of programmes within the multiplex. Specified in ISO/IEC 13818[1]. (DVB)
Single Packet Burst Mode	A burst of ASI bytes (either 188 or 204, depending on packet length) is contiguously grouped into an MPEG-2 Transport Stream packet. Stuffing data is added between the packets to increase the data rate to 270 Mbit/s. See DVB Document A010 rev. 1, Section B3.3, (ASI) Layer-2 Transport Protocol.
Smart Card	A plastic card with a built-in microprocessor and memory used for identification, financial transactions or other authorising data transfer. When inserted into a reader, data is transferred to and from the host machine or a central computer. It is more secure than a magnetic stripe card and it can be disabled if the wrong password is entered too many times. As a financial transaction card, it can be loaded with digital money and used in the same way as cash until the balance reaches zero. The file protocol is specific to its intended application.
SMATV	Satellite Mast Antenna Television: A distribution system, which provides sound and television signals to the households of a building or group of buildings, typically used to refer to an apartment block.
SMPTE	Society of Motion Picture and Television Engineers.
SMS	Subscriber Management System: A system which handles the maintenance, billing, control and general supervision of subscribers to conditional access technology viewing services provided through cable and satellite broadcasting. An SMS can be an automatic (e.g. Syntellect) system where subscribers order entitlements by entering information via a telephone. Alternatively, an SMS can be a manual system, which requires subscribers to speak with an operator who then manually enters their entitlement requests. Some systems support multiple SMSs.
SNG	Satellite News-Gathering.
SNMP	Simple Network Management Protocol.
Spatial Redundancy	Information repetition due to areas of similar luminance and/or chrominance characteristics within a single frame. Removed using DCT and Quantisation (Intra-Frame Coding).
SPI	Synchronous Parallel Interface.
Statistical Redundancy	Data tables are used to assign fewer bits to the most commonly occurring events, thereby reducing the overall bit-rate. Removed using Run Length Coding and Variable Length Coding.
TAXI	Transparent Asynchronous Tx / Rx Interface: A proprietary high-speed data interface.
TCP / IP	Transmission Control Protocol/Internet Protocol: A set of communications protocols that may be used to connect different types of computers over networks.
TDM	Time Division Multiplex: One common, communications channel carrying a number of signals, each with its own allotted time slot.
TDT	Time and Date Table: Part of the DVB Service Information. The TDT gives information relating to the present time and date.
Temporal Redundancy	Information repetition due to areas of little or no movement between successive frames. Removed using motion estimation and compensation (Inter-Frame Coding).
Time-stamp	A term that indicates the time of a specific action such as the arrival of a byte or the presentation of a presentation unit.
TOT	Time Offset Table: This optional SI table supports the use of local offsets as well as the UTC time/date combination. The purpose of the table is to list by country the current offset from UTC and the next expected change to that offset (to track when daylight saving occurs). The offset resolution is to within 1 minute over a range of ±12 hours from UTC.
Transport Stream	A set of packetised elementary data streams and SI streams, which may comprise more than one programme, but with common synchronisation and error protection. The data structure is defined in ISO/IEC 13818-1 [1] and is the basis of the ETSI Digital Video Broadcasting standards.
Transport Stream Packet Header	A data structure used to convey information about the transport stream payload.
TS	Transport Stream.
TSDT	Transport Stream Descriptor Table: A component of the MPEG-2 PSI data. This table describes which type of Transport stream it is in (i.e. DVB, ATSC etc.). It may also contain other descriptors.
TSP	Transport Stream Processor.
TVCT	Terrestrial Virtual Channel Table (ATSC).
U	44.45 mm (rack height standard).

UART	Universal Asynchronous Receiver Transmitter: A device providing a serial interface for transmitting and receiving data.
UHF	Ultra High Frequency: A portion of the electromagnetic spectrum covering 300 MHz to 3000 MHz (3 GHz).
Upconvert	The process by which the frequency of a broadcast transport stream is shifted to a higher frequency range.
Uplink	The part of the communications satellite circuit that extends from the Earth to the satellite.
UPS	Uninterruptable Power Supply: A method of supplying backup power when the electrical power fails or drops to an unacceptable voltage level. Small UPS systems provide battery power for a few minutes; enough to power down the computer in an orderly manner. This is particularly important where write back cache is used. Write back cache is where modified data intended for the disk, is temporarily stored in RAM and can be lost in the event of a power failure. Sophisticated systems are tied to electrical generators that can provide power for days. UPS systems typically provide surge suppression and may provide voltage regulation.
UTC	Universal Time Co-ordinate: An internationally agreed basis for timekeeping introduced in 1972 and based on international atomic time (corresponds to Greenwich Mean Time or GMT).
VCT	Virtual Channel Table (ATSC).
VHF	Very High Frequency: A portion of the electromagnetic spectrum covering 30 MHz to 300 MHz.
VITC	Vertical Interval Time Code.
VITS	Vertical Interval Test Signal: *See:* ITS.
VPS	Video Programming System: A German precursor to PDC
WSS	Wide Screen Switching: Data used in wide-screen analogue services, which enables a receiver to select the appropriate picture display mode.
WST	World System Teletext: System B Teletext. Used in 625 line / 50 Hz television systems (ITU-R 653).
XILINX	A type of programmable Integrated Circuit.
Y (Luminance)	Defines the brightness of a particular point on a TV line. The only signal required for black and white pictures.

Annex B

Technical Specification

Contents

List of Tables

B.1 Inputs

B.1.1 Video

SDI

Table B.1: Serial Digital Video Specification

Item	Specification
Safety status	SELV
Connector designation	SDI IN
Connector type	75 Ω BNC female socket
Input standard (UK/EC) Input standard (USA)	ITU-R RECMN BT.656-3 Interfaces for Digital Component Video Signals in 525-Line and 625-Line Television Systems Operating at the 4:2:2 Level of Recommendation ITU-R BT.601 (Part A). ANSI / SMPTE 259M Television 10-Bit 4:2:2 Component and 4 fsc Composite Digital Signals -Serial Digital Interface. (Encoder only supports Component). Level C - 270 Mbit/s, 525/625 component.
Cable length	250 m, maximum
Recommended cable type	PSF 1/3
Input level	800 mV pk-pk nominal ±10%
Return loss	Better than 15 dB, 10 MHz - 270 MHz
Input impedance	75 Ω (powered-down impedance = 75 Ω)

H SYNC

Table B.2: H SYNC Specification

Item	Specification
Safety status	SELV
Connector designation	H SYNC
Connector type	75 Ω BNC female socket
Input standard	625 line PAL, 525 line PAL-M or 525 line NTSC, chrominance not required.
Input level	1 V pk-pk nominal ±5%
Cable length	250 m, maximum
Return loss	Better than 30 dB up to 6 MHz
Input impedance	75 Ω (powered-down impedance = 75 Ω)

Analogue Video Specification

Table B.3: Analogue Video Specification

Item	Specification
Analogue input	625 line composite PAL-B, -D, -G, -H, -I 525 line composite NTSC-M, PAL-M as specified in ITU-R report 624-4, Characteristics of Television Systems (NTSC with and without set-up of 7.5 IRE)
Connector designation	COMP VIDEO
Connector type	75 Ω BNC socket
Input level	1 V pk-pk nominal ±5%
Return loss	Better than 30 dB up to 6 MHz (when impedance is set to 75 Ω)
Input impedance	75 Ω/High Z switchable (powered-down impedance = 75 Ω)

> NOTE...
> The inputs are isolated from the chassis to prevent 50 Hz/60 Hz hum.

Encoder Settings for PAL / NTSC Video Performance Figures

The Encoder settings for the PAL/NTSC video performance figures are shown in *Table B.4*.

> NOTE...
> The PAL and NTSC video performance figures are measured when the Encoder is connected to a calibrated Receiver.

Table B.4: Encoder Settings for PAL/NTSC Video Performance Figures

Item	Specification
Noise reduction	Off
Video bit-rate	8 Mbit/s
Resolution	720 x 576
GOP	IBBP
Profile	422P@ML
Packet length	188
Mux Bit-rate	40 Mbit/s

PAL Video Performance Figures

Table B.5: PAL System Video Performance Figures

Pattern	Item	Specification
	Input return loss	30 dB
VITS Line 17	Bar amplitude ref (bp)	700 mV ± 7 mV
VITS Line 17	Jitter	5 ns pk-pk
VITS Line 17	Luminance bar tilt	±0.2%
VITS Line 17	2T pulse K-rating	±1.0% KF

Pattern	Item	Specification
VITS Line 17	Pulse/bar K-rating	± 0.5% KF
VITS line 17	P-B ratio	99% - 101%
VITS Line 17	Chrom/lum delay	±20 ns
VITS Line 17	Chrom/lum gain	95 – 105%
100% Luma Ramp	Luma noise weighted Filters: tilt null, unified weighting, 5 MHz LPF, Fsc trap, 100 kHz HP	≤ -60 dB
5-step staircase - modulated	Differential gain	± 1.5%
5-step staircase - modulated	Differential phase	± 1°
5-step staircase - no modulation	Luma non-linearity	≤ 5%
Flat field Red 75%	Chroma noise AM Chroma noise PM Filters: HPF - 10 kHz, LPF 500 kHz Reference – fixed; single line, Field 1	≤ -58 dB ≤ -58 dB
Multiburst VITS line 18	Frequency response	0.5 MHz ±0.2 dB 1.0 MHz ±0.2 dB 2.0 MHz ±0.2 dB 4.0 MHz ±0.2 dB 4.8 MHz ±0.5 dB 5.8 MHz - 0 to –2.5 dB

NTSC Video Performance Figures

Table B.6: NTSC System Video Performance Figures

Pattern	Item	Specification
	Input return loss	30 dB
NTC-7 Composite	Jitter	± 5 ns
NTC-7 Composite	Bar amplitude ref (bp)	100 ±1.5 IRE
NTC-7 Composite	2T pulse K-rating	±1% KF
NTC-7 Composite	Chrom/lum delay	± 20 ns
NTC-7 Composite	Chrom/lum gain	90 - 110%
100% Luma Ramp	Luma noise weighted Filters: tilt null, unified weighting, 5 MHz LPF, Fsc trap, 100 kHz HP	≤ -60 dB
5-step staircase - modulated	Differential gain	±1.5%
5-step staircase - modulated	Differential phase	±1°

Teletext Extraction

Teletext is extracted from the Vertical Blanking Interval (VBI).

International Television Standards

Table B.7 shows television standards appropriate to the Encoder.

Table B.7: International Television Standards

As indicated in Menus	M	M	B	G	H	I	D
Region	USA/Japan		----- Europe / Asia ----			UK	
Standard	NTSC	-- PAL ---------------------------------					
Lines / frame	525	525	625	625	625	625	625
Fields / second	60	60	50	50	50	50	50
Interlace	2/1	2/1	2/1	2/1	2/1	2/1	2/1
Frames / second	30 (29.97)	30 (29.97)	25	25	25	25	25
Lines / second	15 750	15 750	15 625	15 625	15 625	15 625	15 625
Aspect ratio	4 / 3	4 / 3	4 / 3	4 / 3	4 / 3	4 / 3	4/3
Video band (MHz)	4.2	4.2	5.0	5.0	5.0	5.5	6

B.1.2 Audio

Analogue and Digital Audio

Table B.8: Analogue and Digital Audio Specification

Item	Specification
Safety status	SELV
Connector designation	AUDIO IN
Connector type	15-way, D-type male connector
Input standard (analogue)	Balanced analogue
Clip level	12 dB, 15 dB or 18 dB (15 dB available with PCB issue 4 and later)
Sampling rate	32/48 kHz (selectable)
Input impedance	600 Ω or 20 kΩ (selectable). 20 kΩ = default
Input standard (digital)	AES/EBU digital
Termination	110 Ω
Sampling rate	32/48 kHz (selectable)
Input rate	32, 44.1, 48 kHz
Output (digital) ref	AES/EBU digital
Impedance	75 Ω
Sampling rate	48 kHz
Coding Standards	
Coding standard (1)	MPEG-1 Layer 2 (ISO/IEC 13818)
Supported coding modes	Single Mono, Dual Mono, Joint Stereo, Stereo
Supported coded data rate	32 kbit/s - 384 kbit/s (see *Chapter 1, Introduction, Table 1.5*)
Coding standard (2)	Dolby Digital (AC-3) (ATSC A/52, DVB TR 102 154)
Supported coding modes	1/0, 2/0
Supported coded data rate	56 k - 640 kbit/s (see *Chapter 1, Introduction, Table 1.6*)
Coding standard (3)	Dolby Digital AC-3 Pass-through (ATSC A/52, DVB TR 102 154) (see *Note 1*, after Table)
Coding standard (4)	Linear PCM/Dolby E Pass-through (SMPTE 302M) (see *Note 1*, after Table)

NOTES...

1. Refer to *Annex G, Audio Modes* when using these coding standards.
2. Problems may be experienced with some Receivers if the Encoder and Decoder are not using the same version of SMPTE 302M specification, e.g. either 1998 or 2000. The Encoder can be set up to work in either standard.
3. The digital audio input does not support SPDIF.

CAUTION...

When the unit is not powered the audio input defaults to digital with 110 Ω termination.

Table B.9: MUSICAM Analogue Test Specification

Item		Specification
Set-up of Alteia Receiver		
Audio Format		MPEG
Output		Analogue
Clip Level		18 dB
Set-up of Audio Encoder		
Input		Analogue
Clip Level		18 dB
Sampling Frequency		48 kHz
Coding Standard		MUSICAM, MPEG 1 (Layer 2)
Coding Mode		Stereo
Bit-rate		384 k bit/s
Set-up of Lindos Audio Oscillator		
Sequence		TPBDLKZ
Test		Tolerance for Left and Right Legs for Channel (A) and Channel (B)
Test Level	T	
1 kHz @ 0 dB		± 0.2 dB
Sweep 20 Hz - 20 kHz @ ***-20 dB***	P	
20 Hz – 63 Hz		+0.0 to - 0.5 dB
100 Hz – 10 kHz		+0.2 to - 0.3 dB
12.5 Hz – 18 kHz		+0.2 to - 0.5 dB
20 kHz		0 to -1.5 dB
Crosstalk @ 0 dBs	B	
100 Hz		76 dB
1 kHz		78 dB
6.3 kHz		68 dB
10 kHz		63 dB
Distortion + noise @ +8 dB	D	
100 Hz		68 dB
1 kHz		70 dB

Item		Specification
Noise RMS	L	
A-weighted		70 dB
Unweighted		70 dB
User Levels @ 1 kHz (0 to 50 dB)	K	
+10 dB		±0.2 dB
-10 dB		±0.2 dB
-20 dB		±0.2 dB
-30 dB		±0.2 dB
-40 dB		±0.3 dB
-50 dB		0 to -2 dB
Phase @ 0 dBs	Z	
40 Hz		±2°
100 Hz		±2°
315 Hz		±2°
1 kHz		±2°
6.3 kHz		±2°
10 kHz		±2°
15 kHz		±2°

Embedded Audio (Via SDI)

Audio embedded on the serial digital interface can also be extracted. Up to four stereo pairs of audio can be extracted from the SDI. The Encoder can extract two DIDs at once, giving four stereo pairs.

Table B.10: Embedded Audio Specification

Item	Specification
Serial Digital Interface	
Safety status	SELV
Connector designation	SDI IN
Connector type	BNC female connector
Input standard	ITU-R RECMN BT.656-3 SMPTE 272M-A

B.2 Test Tones

Table B.11: Test Tones Specification

Item	Specification
Level	0 dB relative to FSR 18 dB
Frequency	1 kHz at 48 kHz sampling frequency
Bit-rate	96 kbit/s

B.3 Outputs

B.3.1 IF Outputs (1U, E5714)

Table B.12: IF OUT MAIN Specification (1U, E5714)

Item	Specification			
Safety status:	SELV			
Connector designation:	IF OUT MAIN			
Connector type:	BNC, female 75 Ω			
Output impedance:	75 Ω			
Return loss:	>18 dB, 35 < f < 105 MHz			
Output power:	–20 to +5 dBm in 0.1 dB steps			
Power level stability:	±0.5 dB			
Signal type:	QPSK per EN 300 421			
Symbol-rate (minimum)	0.46875 Msymbol/s			
Symbol rate (maximum) vs carrier frequency Fc:	Fc (MHz)	50-60	60-80	80-90
	Symbol-rate Msymbol/s	Fc – 30	30	110 – Fc
Transmit symbol-rate accuracy:	Within 15 ppm			
Convolutional FEC rates:	1/2, 2/3, 3/4, 5/6 and 7/8			
Bit-rate (204 byte format:	2 x Rs x FEC Mbit/s where Rs = Symbol-rate (Msymbol/s) FEC = FEC ratio (values listed above)			
Power spectrum:	Square root raised cosine, α = 0.35 per EN 300 421			
Power spectrum (detail, nominal):	Bandwidth/Rs ratio (BW/Rs) at power spectral density Co values (dB) relative to the power spectral density Coo at the carrier (centre) frequency:			
	Co-Coo (dB)	BW/Rs		
	-3	1.0		
	-6	1.13		
	-10	1.21		
	-20	1.32		
	-30	1.37		
Carrier frequency Fc:	50 – 90 MHz			
Carrier frequency step:	125 kHz			
Carrier frequency accuracy:	Within ± 7.5 kHz			
Carrier suppression:	>40 dB			
IF spectrum inversion:	Selectable on/off			
Residual carrier, carrier OFF state:	< -70 dBm			
Spurious outputs, modulated carrier:	< -60 dBc/4 kHz relative to unmodulated carrier, 0 < f < 500 MHz excluding ±1.06 × Symbol Rate about the carrier frequency			
Spurious outputs, unmodulated carrier	< – 50 dBc < - 55 dBc typical 0 < f < 500 MHz, each component			
Carrier phase noise:	Phase noise density (dBc/Hz)	Frequency offset from carrier		
	< –83	100 Hz		
	< –85	1 kHz		
	< –95	10 kHz		
	< –110	100 kHz		
Transmission modes:	Modulation on/off Carrier on/off			

Table B.13: IF Monitor Output Specification (1U, E5714)

Item	Specification	
Safety status:	SELV	
Connector designation:	IF OUT MONITOR	This connector is normally dedicated to output the IF monitoring feed to the Receiver.
Connector type:	BNC, female 75 Ω	
Output impedance:	75 Ω	
Return loss:	>20 dB, 49.75 < f < 90.25 MHz	
Output power:	–20 dB ±2 dB referenced to main IF output (IF OUT MAIN)	

B.3.2 IF Outputs (E5740-IF)

Table B.14: IF OUT MAIN Specification (E5740-IF)

Item	Specification
Safety status:	SELV
Connector type:	BNC female 75 Ω
Connector designation:	IF OUT MAIN
Output impedance:	75 Ω
Output power:	–20 dBm to +5 dBm in 0.1 dB steps
Power level stability:	± 0.5 dB
Return loss:	>20 dB, 50-180 MHz
Modulation format:	QPSK as per EN 300 421 (DVB-S) 8PSK and 16QAM as per EN 301 210 (DVB-DSNG) (customer options)
FEC rate:	1/2, 2/3, 3/4, 5/6 and 7/8 with QPSK 2/3, 5/6 and 8/9 with 8PSK 3/4, and 7/8 with 16QAM
Symbol rate:	1 to 48 Msymbol/s
Spectrum roll-off factor:	20%, 25%, 30%, 35% selectable
Spectrum sense:	Normal / inverted
Transmission modes:	Modulation on/off Carrier on/off
Carrier frequency:	50-180 MHz, tuneable in 1 kHz steps
Carrier frequency error:	< ±1 kHz (all causes over 10 years)
Carrier ON/OFF ratio:	>60 dB
Carrier suppression:	>40 dB
Phase noise:	< –66 dBc/Hz at 100 Hz offset < –76 dBc/Hz at 1 kHz offset < –86 dBc/Hz at 10 kHz offset < –96 dBc/Hz at 100 kHz offset < –120 dBc/Hz at 1 MHz offset and above
Spurious outputs (modulated carrier):	< –60 dBc/4 kHz over the frequency range 0 to 500 MHz but excluding the frequency range of the wanted output signal (equal to ±1.06 × Symbol Rate about the carrier frequency, as defined by the spectrum mask *Figure A.1* in EN 300 421)
Spurious outputs (unmodulated carrier):	< –55 dBc, each component
Noise floor (N_0/C):	< –120 dBc/Hz
Main / monitor output isolation (both directions):	>30 dB, 50-180 MHz

Table B.15: IF OUT MONITOR Specification (E5740-IF)

Item	Specification
Safety status:	SELV
Connector type:	BNC female 75 Ω
Connector designation:	IF OUT MONITOR
Output impedance:	75 Ω
Output power:	–20 dB ±2 dB relative to main IF output power
Return loss:	>20 dB, 50-180 MHz

B.3.3 L-Band Outputs (E5740-LBAND)

Table B.16: L-Band Out Main Specification (E5740-Lband)

Item	Specification
Safety Status:	SELV
Connector Type:	SMA Female
Connector Designation:	L-Band Out Main
Output Impedance:	50 Ω
Output Power:	-20 dBm to +5 dBm in 0.1 dB steps.
Power Level Stability:	±0.5dB
Return Loss:	>14 dB, 950 MHz to 1750 MHz
Modulation format:	BPSK as per ETSI TR 101 198 (option) QPSK as per EN 300 421 (DVB-S) 8PSK, 16QAM as per EN 301 210 (DVB-DSNG) (option)
FEC Rate:	1/2, 2/3, 3/4, 5/6, 7/8 with BPSK and QPSK 2/3, 5/6, 8/9 with 8PSK 3/4, 7/8 with 16QAM
Symbol Rate:	1 – 48 Msym/s (0.3 – 48 Msym/s option available).
Spectrum roll-off factor:	20%, 25%, 30%, 35% selectable
Spectrum sense:	Normal/Inverted
Transmission Modes:	Modulation on/off Carrier on/off
Carrier frequency:	950 MHz to 1750 MHz in 1 kHz steps
Carrier Frequency Error:	<± 1 kHz (all causes over 10 years)
Phase Noise:	<-46 dBc at 10 Hz offset <-66 dBc at 100 Hz offset <-76 dBc at 1 kHz offset <-86 dBc at 10 kHz offset <-96 dBc at 100 kHz offset <-120 dBc at 1 MHz offset
Spurious Output:	<-60 dBc/4 kHz (modulated carrier) 500 – 2500 MHz <-55 dBc (unmodulated carrier) 500 – 2500 MHz
Noise Floor (No/C):	<-120 dBc/Hz

Table B.17: L-Band Monitor Output Specification (E5740-Lband)

Item	Specification
Safety Status:	SELV
Connector Type:	F-type Female
Connector Designation:	L-Band Out Monitor
Output Impedance:	75 Ω
Output Power:	- 30 dB ± 3 dB relative to main output
Return Loss:	>10 dB, 950 MHz to 1750 MHz

B.3.4 OFDM Modulator Outputs (E5750)

Table B.18: OFDM IF Out 1 Specification (E5750)

Item	Specification
Safety Status:	SELV
Connector Type:	BNC Female
Connector Designation:	IF Out 1 Main
Output Impedance:	75 Ω
Output Power:	0 dBm
IF Frequency:	70 MHz
Bandwidth:	6 MHz, 7 MHz, or 8 MHz
Modulation:	QPSK, 16QAM or 64QAM
Guard Interval:	1/32, 1/16, 1/8 or 1/4
FEC Rate:	1/2, 2/3, 3/4, 4/5, 5/6 or 7/8
Spectrum sense:	Normal/Inverted
Transmission Modes:	2k mode or 8k mode

Table B.19: OFDM IF Out 2 Specification (E5750)

Item	Specification
Safety Status:	SELV
Connector Type:	BNC Female
Connector Designation:	IF Out 2
Output Impedance:	75 Ω
Output Power:	- 10 dB relative to IF output 1

B.3.5 ASI Out 1, ASI Out 2, ASI Out 3 Outputs

Table B.20: ASI Out Specification

Item	Specification
Safety status:	SELV
Connector type:	BNC 75 Ω
Connector designation:	ASI OUT 1, ASI OUT 2, ASI OUT 3

B.4 Control and Monitoring

B.4.1 Remote Control - Ethernet 1 and 2

Table B.21: Ethernet Specification

Item	Specification
Safety status	SELV
Connector designation	ETHERNET#1 and ETHERNET#2
Connector type	8-way RJ-45 socket, 10BaseT (ISO 882/3)

B.4.2 Local Control

Local control is by means of the front panel keypad and LCD display.

B.4.3 Alarm

Table B.22: Alarm Specification

Item	Specification
Safety status	SELV
Connector designation	ALARM
Connector type	9-way D-type male
Alarm contacts	Change-over contacts (5 Ω in common)
Fail contacts	Change-over contacts (5 Ω in common)
Reset contacts	Short pins 9 and 5 (resets the Encoder)
Relay Contact Rating	
Maximum switching power	30 W
Maximum switching voltage	110 V
Maximum switching current	1 A

B.4.4 Remote Control

This connector provides an RS-232/RS-485 user interface control port that allows the unit to be controlled by an external master.

Table B.23: Remote Control Specification

Item	Specification
Safety status	SELV
Connector designation	REMOTE CONTROL
Connector type	9-way D-type male

B.4.5 RS-232 Data (Asynchronous)

RS-232 is not currently supported on the Base Board in Build version 2.0.0 but it is in the option module M2/EOM2/DAT.

B.4.6 RS-422 Data

This provides an RS-422 synchronous, serial communications data input interface.

Table B.24: RS-422 Data Specification

Item	Specification
Safety status	SELV
Type	ITU-T V.11 (RS-422), synchronous serial data and external clock
Connector designation	RS-422 DATA
Connector type	15-way D-type female
Clock frequencies	n x 64 kbit/s from 64 kbit/s to 2048 kbit/s (selectable) or n x 56 kbit/s from 56 kbit/s to 1792 kbit/s (selectable)
Time-stamp	Not supported
Operation modes	Bit-pipe - Transport packet alignment and byte alignment relative to the incoming bit-stream are arbitrary.

B.5 Power Supply

B.5.1 AC Power Input

This equipment is fitted with an wide-ranging power supply. It is suitable for supply voltages of 100-120 Vac -10% +6% or 220-240 Vac -10% +6% at 50/60 Hz nominal.

Table B.25: AC Power Supply Specification

Item		Specification
Power distribution system		Type TN ONLY (EN 60950 para 1.2.12.1): Power distribution system having one point directly earthed, the exposed conductive parts of the installation being connected to that point by protective earth conductors. This equipment must NOT be used with single-phase three-wire and PE, TT or IT Type Power distribution systems.
Connection to supply		Pluggable Equipment Type A (EN 60950 para 1.2.5): Equipment which is intended for connection to the building power supply wiring via a non-industrial plug and socket-outlet or a non-industrial appliance coupler or both. Correct mains polarity must always be observed. Do not use reversible plugs with this equipment.
Class of equipment		Class I Equipment (EN 60950 para 1.2.4): electric shock protection by basic insulation and protective earth.
Rated voltage		100-120/220-240 Vac (single phase)
Rated frequency		50/60 Hz
Voltage selection		Wide-ranging
Rated current	1U	2 A (100-120 Vac range) 1 A (220-240 Vac range)
	2U	4 A (100-120 Vac range) 2 A (220-240 Vac range)
Input connector		CEE 22/IEC 3-pin male receptacle
Fuse		Fuse in live conductor in power input filter at rear of unit. Do not use reversible plugs with this equipment.
Fuse type		Bussmann S505 Littelfuse 215 5x20 mm time delay (T) 1500 A breaking capacity (HBC) IEC/EN 60127-2 Sheet 5
Fuse current rating		5 A 250 V T HBC
Power consumption	1U	85 W maximum (NO options fitted) 150 W maximum (WITH options fitted)
	2U	100 W maximum (NO options fitted) 250 W maximum (WITH options fitted)
Stand-by power	1U 2U	6 W typically 15 W typically

B.5.2 DC Power Input

The power unit used in the Encoder is a soft-start type designed for use on dc supplies having a negative or positive earth (vehicle chassis) voltage supply in the range 12 to 36 Vdc.

Table B.26: DC Power Supply Specification

Item	Specification
Rated Voltage:	12– 36 Vdc supplies only. Correct polarity must always be observed. (This is the voltage required at the DC INPUT connector when the unit is powered on)
Rated Current:	4 A at 36 V rising to 12 A at 12 V.
Input Connector:	3 pin Jaeger plug
Power Consumption (On)	7.7 A at 12 V reducing to 2.8 A at 36 V
Power Consumption (Stand-by)	45 mA at 12 V rising to 150 mA at 36 V

B.6 Physical Details

Table B.27: Physical Details

Item	Specification
Height	1U, 44.5 mm chassis 2U, 88.9 mm chassis
Width	1U, 442.5 mm excluding fixing brackets 2U, 442.5 mm excluding fixing brackets
Overall width	1U, 482.6 mm including fixing brackets 2U, 482.6 mm including fixing brackets
Depth	1U, 545 mm excluding rear connector clearance 2U, 545 mm excluding rear connector clearance
Approximate weight	1U, 7.5 kg (16.5 lbs) 2U, 11.5 kg (25.3 lbs)

B.7 Environmental Conditions

Table B.28: Environmental Specification

Item	Specification
Operational	
Temperature	-10°C to +50°C (14°F to 122°F) ambient with free air-flow
Over temperature alarm generated at	>= 55°C
Under temperature alarm generated at	< 0°C
Temperature checked	Once every 30 seconds
All fans switched off at	< 10°C (when set to auto)
Half the fans switched off at	< 20°C (when set to auto)
All fans on at	>= 20°C (when set to auto)
Relative humidity	0% to 90% (non-condensing)
Cooling requirements	Front section: Cool air input from front panel, exhaust from right side of unit Rear section: Cool air input from right side of unit, exhaust from left side of unit See *Chapter 2, Installing the Equipment, Figure 2.2*
Handling/movement	Designed for stationary or fixed use when in operation
Storage/Transportation	
Temperature	-20°C to +70°C (-4°F to 158°F)
Relative humidity	0% to 90% (non-condensing)

B.8 Compliance[1]

B.8.1 Safety

This equipment has been designed and tested to meet the requirements of the following:

EN 60950	European	Safety of information technology equipment including business equipment.
IEC 60950	International	Safety of information technology equipment including business equipment.

In addition, the equipment has been designed to meet the following:

UL 1950	USA	Safety of information technology equipment including business equipment.

[1] The version of the standards shown is that applicable at the time of manufacture.

B.8.2 EMC[2]

The equipment has been designed and tested to meet the following:

EN 55022 and AS/NZS 3548	European Australia and New Zealand	Emission Standard Limits and methods of measurement of radio frequency interference characteristics of information technology equipment - Class A.
EN 61000-3-2[3]	European	Electromagnetic Compatibility (EMC), Part 3 Limits; Section 2. Limits for harmonic current emissions (equipment input current ≤ 16 A per phase).
EN 61000-3-3[3]	European	Electromagnetic Compatibility (EMC), Part 3. Limits; Section 3. Limitation of voltage fluctuations and flicker in low voltage supply systems for equipment with rated current ≤ 16 A.
EN 55024:1998	European	Information technology equipment - Immunity characteristics - Limits and methods of measurement.
FCC	USA	Conducted and radiated emission limits for a Class A digital device, pursuant to the Code of Federal Regulations (CFR) Title 47-Telecommunications, Part 15: Radio frequency devices, subpart B - Unintentional Radiators.

B.8.3 Shock and Vibration

The Encoder and Receiver chassis complies with the requirements of ETS 300-019-2-5 Table 2, for both non-operational and operational states, without any special mounting or casing requirements over and above the standard mounting requirements specified.

ETS 300-019-2-5	European	Equipment Engineering (EE): Environmental conditions and environmental tests for telecommunications equipment Part 2-5: Specification of environmental tests Ground Vehicle Installations. Table 2.

[2] The EMC tests were performed with the Technical Earth attached, and configured using recommended cables (see *Table B.29*).
[3] Applies only to models of the Encoder using mains (ac) power sources.

B.8.4 CE Marking

The CE mark is affixed to indicate compliance with the following directives:

89/336/EEC of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility.

73/23/EEC of 19 February 1973 on the harmonisation of the laws of the Member States relating to electrical equipment designed for use within certain voltage limits.

> NOTE...
> The CE mark was first affixed to this product in 2001.

B.8.5 C-Tick Mark

N10196

The C-Tick mark is affixed to denote compliance with the Australian Radiocommunications (Compliance and Labelling – Incidental Emissions) Notice made under s.182 of Radiocommunications Act 1992.

> NOTE...
> The C-Tick mark was first affixed to this product in 2001.

B.9 Cable Types

The signal cable types (or similar) in *Table B.29* are those recommended by TANDBERG Television in order to maintain product EMC compliance.

Table B.29: Suitable Signal Cable Types

Signal Type	Connector	Cable
RS-232	9-way D-type Male	Belden 8162 CM 2PR24 shielded E108998 (typical)
Ethernet	RJ-45	Alcatel Data Cable FTP 7 x 0.16
ASI Outputs	BNC	Canford Audio BBC 1/3 PSF (type 2 Video cable)
SDI In (Video Input)	BNC	Canford Audio BBC 1/3 PSF
H SYNC	BNC	Canford Audio BBC 1/3 PSF
Composite Video (Input)	BNC	Canford Audio BBC 1/3 PSF
Audio (Input)	15-way D-type Male	Canford Audio DFT 110 Ω
RF	BNC	Canford Audio BBC1/3 PSF
Audio Out (XLR Expander Card)	XLR	Canford Audio DFT cable

B.10 Option Modules

B.10.1 M2/EOM2/AUDLIN Additional Audio and Linear PCM Option Module

See *Section B.1.2, Audio* for details.

B.10.2 M2/EOM2/DAT RS-232 and RS-422 Data Input Option

Asynchronous Data Input

A 9-way, D-type female connector provides an RS-232 asynchronous, serial communications data input interface.

Table B.30: RS-232 Asynchronous Data Input Specification

Item	Specification
Safety status	SELV
Type	ITU-T V.24/V.28 (RS-232D) asynchronous serial data
Connector designation	ASYNC
Connector type	9-way D-type female
Supported baud rates	1200, 2400, 4800, 9600, 19200, 38400 baud
Control mechanism	XON/XOFF
Time-stamp	Not supported

Synchronous Data Input

A 15-way, D-type female connector provides an RS-422 synchronous, serial communications data input interface.

Table B.31: RS-422 Synchronous Data Input Specification

Item	Specification
Safety status	SELV
Type	ITU-T V.11 (RS-422), synchronous serial data and external clock
Connector designation	SYNC
Connector type	15-way D-type female
Clock frequencies	n x 64 kbit/s from 64 kbit/s to 2048 kbit/s (selectable) or n x 56 kbit/s from 56 kbit/s to 1792 kbit/s (selectable)
Time-stamp	Not supported
Operation modes	Bit-pipe - Transport packet alignment and byte alignment relative to the incoming bit-stream are arbitrary.

B.10.3 M2/EOM2/REMUX Remux Option Module

Connectors

> NOTE...
> The M2/EOM2/REMUX Remux Option Module is supported by Encoder software version 2.2.0 and later.

Table B.32: DVB ASI In 1, 2 and 3 Connector

Item	Specification
Safety status	SELV
Connector designation	DVB ASI IN 1, DVB ASI IN 2, DVB ASI IN 3
Connector type	BNC
Connector impedance	75 Ω[4]
Data coding	8B/10B
Channel rate	270 Mbit/s
Specification	DVB A010 rev 1 (Asynchronous Serial Interface)[5]

Table B.33: DVB ASI Out 1 Connector (Disabled)

Item	Specification
Safety status	SELV
Connector designation	DVB ASI OUT 1
Connector type	BNC
Connector impedance	75 Ω[4]
Data coding	8B/10B
Channel rate	270 Mbit/s
Specification	DVB A010 rev 1 (Asynchronous Serial Interface)[5]

LEDs

Table B.34: DVB ASI In 1, 2 and 3 - LED Indications

Item	Specification
Red LED	Input ASI lock
On	No lock on ASI (8B/10B coding)
Off	Input ASI lock OK
Green LED	Packet size
Off	Not locked to MPEG packets
Flash (1:3 mark:space)	188 byte packets
Flash (3:1 mark:space)	204 byte packets

[4] 75 Ω terminator must be fitted when this interface is not in use.
[5] Byte mode and single packet burst mode only.

Table B.35: DVB ASI Out 1 - LED Indications

Item	Specification
Red LED	
On	Output disabled
Off	Output enabled
Green LED	
Off	Output not in use
Flash (1:3 mark:space)	188 byte packets output
Flash (3:1 mark:space)	204 byte packets output

B.10.4 M2 / EOM2 / XLR, XLR Expander Card Option

> NOTE...
> The M2/EOM2/XLR, XLR Expander Card Option is supported by Encoder software version 3.0 and later.

Table B.36: Analogue and Digital Audio (XLR Expander Card)

Item	Specification
Inputs	
Safety status	SELV
Connector designation (inputs)	AUDIO IN L AES/EBU, AUDIO IN R
Connector type	Three- way XLR female
Input standard (analogue)	Balance analogue
Clip Level	15 dB or 18 dB
Sampling rate	48 kHz
Input impedance	600 Ω or 20 kΩ
Input standard (digital)	AES/EBU Digital
Termination	110 Ω
Sampling Rate	Not applicable
Input rate	32, 44.1, 48 kHz (when using MPEG1 Level 2 or AC-3), see audio section for further details.
Outputs	
Safety status	SELV
Connector designation (outputs)	AUDIO OUT L AES/EBU, AUDIO OUT R
Connector type	Three- way XLR male
Output standard (analogue)	Balance analogue
Clip Level	15 dB or 18 dB FSR
Sampling rate	Same as digital source rate
Output impedance	10 Ω (typically)
Output standard (digital)	AES/EBU Digital
Output impedance	110 Ω
Output rate	Same as digital source
When the unit is not powered the XLR IN L AES/EBU audio input defaults to AES/EBU with 110 Ω termination	

B.10.5 M2/EOM2/DEC, SD Decoder Card Option

NOTE...
The M2/EOM2/DEC, SD Decoder Card Option is supported by Encoder software version 3.1 and later.

Table B.37: ASI Output (SD Decoder)

Item	Specification
Safety Status:	SELV
Connector Type:	BNC Female
Connector Designation:	ASI Out (Located on the adjacent demod option card)
Output Impedance:	75 Ω
Data Coding:	8B/10B
Channel Rate:	270 Mbit/s
Specification:	DVB A1010 rev 1 (Byte mode only)

Table B.38: Composite Video Output (SD Decoder)

Item	Specification
Safety Status:	SELV
Connector Type:	BNC Female
Connector Designation:	Composite
Output Impedance:	75 Ω
Video Standards:	PAL–N, -B, -G, or –I, or NTSC–M with or without pedestal
Composite Video Level:	1V pk-pk in 75 Ω nominal

Table B.39: Digital Video Output (SD Decoder)

Item	Specification
Safety Status:	SELV
Connector Type:	BNC Female
Connector Designation:	SDI
Output Impedance:	75 Ω
Video Standards:	ITU-R BT.656 digital output at 270 MHz
Composite Video Level:	800mV ± 10 mV pk-pk in 75 Ω nominal

Table B.40: Audio Output (SD Decoder)

Item	Specification
Safety Status:	SELV
Connector Type:	15-way D-Type Female
Analogue Output	
Nominal Output Impedance:	50 Ω
Clip Level:	+6 dBm to +18 dBm
Sampling Rate:	Same as digital source
Digital Output	
Output Format:	AES/EBU in IEC958 Analogue, Consumer, Compressed or Professional
Output Impedance:	110 Ω
Sampling Rate:	Same as digital source

Table B.41: Data Output (SD Decoder)

Item	Specification
Safety Status:	SELV
Connector Type:	9-way D-type Female
Connector Designation:	Data
RS-232 Asynchronous Data	
Data Rate:	1200, 2400, 4800, 9600, 19200 bit/s
Standards:	EIA RS232C / ITU-T BT. V.24/V.28
RS-422 Synchronous Data	
Data Rate:	In integer multiples of 56 kbit/s and 64 kbit/s up to 2.048 Mbit/s

B.10.6 M2 / EOM2 / QPSKDEMOD, QPSK Demodulator Card Option

> NOTE...
> The M2/EOM2/QPSKDEMOD, QPSK Demodulator Card Option is supported by Encoder software version 3.1 and later.

Table B.42: IF In (QPSK Demodulator)

Item	Specification
Safety Status:	SELV
Connector Type:	BNC Female
Connector Designation:	IF IN
Input Impedance:	75 Ω
Input Power:	-20 dBm to –40 dBm
Input Frequency:	50 MHz to 180 MHz
Capture Range:	Up to ± 5 MHz
Signal Type:	BPSK as per ETSI TR 101 198 (option) QPSK as per EN 300 421 (DVB-S)
Symbol Rate:	1 – 45 Msym/s (0.3 – 45 Msym/s optionally)

Table B.43: RF In (QPSK Demodulator)

Item	Specification
Safety Status:	SELV
Connector Type:	F-type Female
Connector Designation:	RF1, RF 2
Input Impedance:	75 Ω
Input Power:	-25 dBm to –65 dBm
Input Frequency:	950 MHz to 2150 MHz
Capture Range:	Up to ± 5 MHz
Signal Type:	BPSK as per ETSI TR 101 198 (option) QPSK as per EN 300 421 (DVB-S)
Symbol Rate:	1 – 45 Msym/s (0.3 – 45 Msym/s optionally)

B.10.7 M2/EOM2/SATDEMOD, 16QAM Demodulator Card Option

NOTE...
The M2/EOM2/SATDEMOD, 16QAM Demodulator Card Option is supported by Encoder software version 3.1 and later.

Table B.44: L-band Inputs (16QAM Demodulator)

Item	Specification
Safety Status:	SELV
Connector Type:	F-type Female
Connector Designation:	L-Band Input 1, L-Band Input 2
Input Impedance:	75 Ω
Input Power (maximum):	-25 dBm
Capture Range:	Up to ± 3.5 MHz
Signal Type:	QPSK as per EN 300 421 (DVB-S) BPSK/16QAM as per EN 301 210 (DVB-DSNG) (option)
Symbol Rate:	1 – 45 Msym/s

B.10.8 M2/EOM2/IP, IP Output Card Option

NOTE...
The M2/EOM2/IP, IP Output Card Option is supported by Encoder software version 3.1 and later.

Table B.45: Ethernet Port (IP Output Card)

Item	Specification
Safety Status:	SELV
Connector Type:	8-way RJ-45
Connector Designation:	10/100 BT
Signal Type:	10/100-baseT Ethernet (IEEE 802.3/802.3u)
Transport Stream Rate:	Up to 50 Mbit/s

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Annex C

Predefined User Configurations

Contents

List of Tables

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C.1 Introduction

There are sixteen predefined user configurations. These are a quick and easy way to configure the Encoder without having to enter individual parameters.

C.2 525/625 Line Default Settings

Table C.1: 525/625 Line Default Settings

Lines	Frame Rate	GOP Length
525	29.97 Hz	15
625	25 Hz	12

C.3 General Default Settings

The Encoder parameters and default settings are as shown in *Table C.2*.

Table C.2: Default Configuration Settings

Module	Parameter	Default Value
System:	UTC Offset	0
	Config Name	Config Name
	Screen Saver	Off
	Screen Saver Delay	300 s
	Key Beeper	On
	Power Dip Recovery	Off
	Fan Control	Auto (Temp. Controlled)
	Service Name	Default Service
	Service Provider	Service Provider
	Network Name	TANDBERG
	Syntax	DVB
	Network Id	0xFFFF
	Service Id	1
	Transport Stream Id	1
	PMT PID	0x20
	ATSC Program	2
	SI Level	On (DVB compliant)
	PSIP Source (ATSC)	BNC 1
	PSIP Min PID	0x1FD0
	PSIP Max PID	0x1FFE
	Logical Channel Descriptor	Off
	Logical Channel	1
	Logical Channel Descriptor Id	0x83

Module	Parameter	Default Value
	Output Mode	Satellite
	Setup Password	Off
	Display Errors	Yes
	LCD Brightness	Medium
	SNMP Control During Initialisation	No Reply
	System Type	Local
	Action on PID Error	Auto Correct
	MEM Error Handling	Report Errors
	IP Address	0.0.0.0
	Network Mask	0.0.0.0
	Gateway Address	0.0.0.0
	Serial Number (if non-zero used for MAC address)	0
	SNMP Master	0.0.0.0
	SNMP Trap Address	0.0.0.0
	SABus Address	0x31
	SABus Port	RS-485
	SABus Baud Rate	19200
	SABus Data Bits	8, 1 stop bit
Mux:	Active Clock	Local Oscillator
	On Air (ASI Output)	On
	Packet Length	188 bytes
	PCR PID	0x1FFE
	Bit-Rate (188)	40 Mbit/s
	Bit-Rate (204)	43.404255 Mbit/s
	Host Bit-Rate (Remux)	40 Mbit/s
	Remux Mode	Dumb
	Scrambling (RAS/BISS)	Off
	SNG RAS1 Key	0000000
	RAS1 Key 1	Not Set
	RAS1 Key 2 (EBU)	Not Set
	RAS1 Key 3 (future extensions)	Not Set
	BISS-E Session Word	Not Set
	BISS Injected Id	Not Set
	BISS Code	Not Set
Video Preprocessor:	Frame Rate	25 Hz
	Noise Reduction	Off
	Video Input	Serial
	Analogue Input Termination	On
	Output on Video Loss	Freeze Frame
	Audio 1-2 DID	Auto (0x2FF)
	Audio 3-4 DID	Auto (0x1FD)
	Analogue Calibration	Calibrated
	OSD from Flash	Not Set

Module	Parameter	Default Value
	Ident Text	Ident Mode
	Ident Text Foreground Colour	White
	Ident Text Background Colour	Blue
	Ident Text Translucence	Semi-translucent
VBI:	Teletext Enable (shortcut)	On
	Teletext PID	273
	Min No. Teletext Packets/field	3
	VBI Data on PID	On
	VBI Data PID	277
	Closed Caption	On
	Closed Caption Format	TANDBERG
	VBI in Picture	Off
	VPS (line 16 shortcut)	On
	WSS (line 23 shortcut)	On
	Auto VITC Detect	Off
Video Encoder:	Profile/level	MP@ML
	Reflex	Off
	Compression Mode	Standard
	Compression Mode Options	Fixed and Seamless Modes
	Field/Frame Encoding	Frame Only
	Resolution	720x576
	GOP Length	12
	GOP Structure	IBBP
	Long GOP	Off
	Copyright Flag	Off
	Original Flag	Off
	3:2 Pulldown	Off
	Aspect Ratio	4:3
	Bit-rate	8 Mbit/s
	VBR Mode	Off
	PID	308
	NTSC Line Start	Line 23
	I Frame on Scene Cut	Off
	Rate Buffer Mode	Medium
	AFD	Off
	Video Bandwidth / Horizontal Filter	Medium
	Closed Caption Parity (E4/MX VCM card)	None
	Auto Concatenation	Off
Audio (MPEG-2):	Coding Standard	MPEG Layer 2
	Source	Analogue (On)
	6 dB Gain	Off
	Silence Timeout	0 s (Off)
	Emphasis	Off
	Language (L)	English

Module	Parameter	Default Value
	Language (R)	English
	Clip Level	18 dB
	PID	0x100 - 0x105
	Termination	20 kΩ
	Auto Lip Sync	On
	Lip Sync Delay	111 ms
	Lip Sync Offset	0 ms
Audio (Dolby Digital (AC-3)):	Bit-rate	192 kbit/s
	Bit-stream Mode	Complete Main
	Coding Mode	2/0 (Stereo)
	Copyright	Off
	Original	Off
	Dolby Surround Mode	Not Indicated
	Dialogue Normalisation	-27 dB
	Audio Production Information	Off
	Mixing Level	25 dB
	Room Type	Small room
	Dynamic Range Compression	Film/Standard
	Sampling Frequency	48 kHz
	Channel Bandwidth Low Pass Filter	On
	DC High Pass Filter	On
	RF Protection	Off
	Surround Mixing Level	3 dB
	LFE Low Pass Filter	Off
	External Delay	179 ms
Audio Musicam (MPEG-2):	Bit-rate	384 kbit/s
	Coding Mode	Stereo
	Copyright	Off
	Original	Off
	Sampling Frequency	48 kHz
Linear PCM:	Linear PCM SMPTE Standard	Year 2000
	Linear PCM Channel Number	0
RS-422 Data:	RS-422 Data Encode	Off
	RS-422 Data Delay (Option Module)	250 ms
	RS-422 Bit-rate	64 kbit/s
	PID	0x121, 0x123, 0x125 or 0x127
	RS-422 Test Mode (Base Board Only)	Off
	RS-422 SNMP oid ref. (Base Board Only)	1
RS-232 Data:	RS-232 Data Encode	Off
	RS-232 Data Delay (Option Module)	200 ms
	RS-232 Baud Rate	38400
	PID	0x120, 0x122, 0x124 or 0x126
	RS-232 Test Mode (Base Board Only)	Off
	RS-232 SNMP oid ref (Base Board Only)	1

C.4 Predefined User Configurations

The predefined user configurations have the same settings as *Table C.2* except for those differences shown in *Table C.3.*

Table C.3: Predefined User Configurations

Configuration Number	Service Name	Variable	Value
1	Standard 6 MHz	Video Bit-rate	2 Mbit/s
		Video Compression Mode	Standard Delay
		Video Profile/Level	MP@ML
		GOP Structure	IBBP
2	Standard 7.5 MHz	Video Bit-rate	4 Mbit/s
		Video Compression Mode	Standard Delay
		Video Profile/Level	MP@ML
		GOP Structure	IBBP
3	Standard 9 MHz	Video Bit-rate	6 Mbit/s
		Video Compression Mode	Standard Delay
		Video Profile/Level	MP@ML
		GOP Structure	IBBP
4	Standard 13.5 MHz	Video Bit-rate	8 Mbit/s
		Video Compression Mode	Standard Delay
		Video Profile/Level	MP@ML
		GOP Structure	IBBP
5	Standard 18 MHz	Video Bit-rate	15 Mbit/s
		Video Compression Mode	Standard Delay
		Video Profile/Level	MP@ML
		GOP Structure	IBBP
6	Very Low Delay 6 MHz	Video Bit-rate	2 Mbit/s
		Video Compression Mode	Very Low Delay
		Video Profile/Level	MP@ML
		GOP Structure	IP
7	Very Low Delay 7.5 MHz	Video Bit-rate	4 Mbit/s
		Video Compression Mode	Very Low Delay
		Video Profile/Level	MP@ML
		GOP Structure	IP
8	Very Low Delay 9 MHz	Video Bit-rate	6 Mbit/s
		Video Compression Mode	Very Low Delay
		Video Profile/Level	MP@ML
		GOP Structure	IP
9	Very Low Delay 13.5 MHz	Video Bit-rate	8 Mbit/s
		Video Compression Mode	Very Low Delay
		Video Profile/Level	MP@ML
		GOP Structure	IP
10	Very Low Delay 18 MHz	Video Bit-rate	15 Mbit/s
		Video Compression Mode	Very Low Delay
		Video Profile/Level	MP@ML
		GOP Structure	IP

Configuration Number	Service Name	Variable	Value
11	Mega Low Delay 6 MHz	Video Bit-rate	2 Mbit/s
		Video Compression Mode	Mega Low Delay
		Video Profile/Level	MP@ML
		GOP Structure	IP
12	Mega Low Delay 7.5 MHz	Video Bit-rate	4 Mbit/s
		Video Compression Mode	Mega Low Delay
		Video Profile/Level	MP@ML
		GOP Structure	IP
13	Mega Low Delay 9 MHz	Video Bit-rate	6 Mbit/s
		Video Compression Mode	Mega Low Delay
		Video Profile/Level	MP@ML
		GOP Structure	IP
14	Mega Low Delay 13.5 MHz	Video Bit-rate	8 Mbit/s
		Video Compression Mode	Mega Low Delay
		Video Profile/Level	MP@ML
		GOP Structure	IP
15	Mega Low Delay 18 MHz	Video Bit-rate	15 Mbit/s
		Video Compression Mode	Mega Low Delay
		Video Profile/Level	MP@ML
		GOP Structure	IP
16	422P@ML 18 MHz	Video Bit-rate	25 Mbit/s
		Video Compression Mode	Standard Delay
		Video Profile/Level	422P@ML
		GOP Structure	IBBP

Annex D

Language Abbreviations

Languages are shown in alphabetical order.

LANGUAGE	ABBREVIATION
AFRIKAANS	AFR
ALBANIAN	ALB
ARABIC	ARA
BASQUE	BAQ
BRETON	BRE
BULGARIAN	BUL
CHINESE	CHI
CZECH	CZE
DANISH	DAN
DUTCH	DUT
ENGLISH	ENG
ESTONIAN	EST
FINNISH	FIN
FRENCH	FRE
GAELIC	GAE
GERMAN	GER
GREEK	GRE
HUNGARIAN	HUN
ICELANDIC	ICE
INDONESIAN	IND
IRISH	IRI
ITALIAN	ITA
JAPANESE	JPN
KOREAN	KOR
LATVIAN	LAV
LITHUANIAN	LIT

LANGUAGE	ABBREVIATION
MACEDONIAN	MAC
MALAY	MSA
MISCELLANEOUS	MIS
MULTIPLE LANGUAGES	MUL
NDEBELE	NDE
NORWEGIAN	NOR
POLISH	POL
PORTUGESE	POR
ROMANIAN	RUM
RUSSIAN	RUS
SERBO-CROAT	SCR
SLOVAK	SLK
SOMALI	SOM
SPANISH	SPA
SWAHILI	SWA
SWEDISH	SWE
THAI	THA
TIBETAN	TIB
UNDEFINED	UND
UKRANIAN	UKR
WELSH	CYM

The following non-ISO[1] languages are supported.

NOTE...

Only applicable for a transport stream going to an Alteia Receiver.

REFERENCE	ABBREVIATION
MAIN	ONE
AUX	TWO
INTERNATIONAL SOUND	INT
AUDIO 1	AAA
AUDIO 2	AAB
AUDIO 3	AAC
AUDIO 4	AAD
AUDIO 5	AAE
AUDIO 6	AAF
AUDIO 7	AAG
AUDIO 8	AAH
AUDIO 9	AAI
AUDIO 10	AAJ
AUDIO 11	AAK
AUDIO 12	AAL
AUDIO 13	AAM
AUDIO 14	AAN
AUDIO 15	AAO
AUDIO 16	AAP

The non-ISO languages allow tagging of audio without reference to specific languages. The system can then transmit two languages (as Main and Auxiliary) which could be any type of audio.

NOTE...

The non-ISO languages need to be user defined in the MEM or Encoder for them to be available

[1] International Standards Organisation.

Annex E

Creating and Downloading a Logo

Contents

List of Tables

List of Figures

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E.1 Introduction

The Encoder includes a logo overlay facility whereby an image can be overlaid onto the active video prior to encoding. This enables broadcasters to trademark or brand their material with a logo.

To overlay the material with a logo, the logo must first be downloaded into the equipment using the Ethernet TFTP protocol. Once this has been done the logo can be enabled or disabled. Contact TANDBERG Television for further details.

E.2 Summary of Features

Up to 13 logos can be overlaid onto the active video. The space each logo occupies is referred to as a region. If two logo regions share a horizontal line they may interfere with each other, so this should be avoided, (see *Section E.7.5*). i.e. logos may be placed adjacent vertically, but not horizontally. Logos cannot be overlapped.

One logo can be downloaded into Flash memory and will still be present after the Encoder has been powered OFF. All other logos are stored in volatile memory and will be lost when the Encoder is powered OFF.

To create and download logos to the Encoder, two Windows applications are required, *Osd Creator* and *Osd Loader*. Once a logo has been downloaded to Flash it can be enabled/disabled from the front panel menu: `Setup/Video/Video source/Stored OSD`. Logos downloaded to volatile memory can only be controlled by the OSD Loader application running from a PC.

Logos are defined at pixel resolution and include a red, green, blue and transparency component. Logos can be positioned anywhere in the active video and can be any size from 1x1 pixel to the full size of the active picture (720x576 or 720x480 pixels). Logos are limited to a maximum of 256 colours, including different levels of transparency.

The logo is overlaid onto the active picture prior to horizontal and vertical down-sampling, noise reduction and video bandwidth filtering, if these are used.

E.3 OSD Programs Built Into the Encoder

Two Windows applications are required for creating and downloading logos to the Encoder, namely *Osd Creator* and *Osd Loader*. These programs are stored permanently in the Encoder where they can be downloaded via the Web Browser Interface. Further information is available in *Chapter 5, Web Browser Interface*. These applications must be unzipped and saved to a PC prior to use. This requires WinZip to be installed on the PC.

Using the Web Browser interface, see *Figure E.1*, select **Option 2 Tools, OSD Toolkit**.

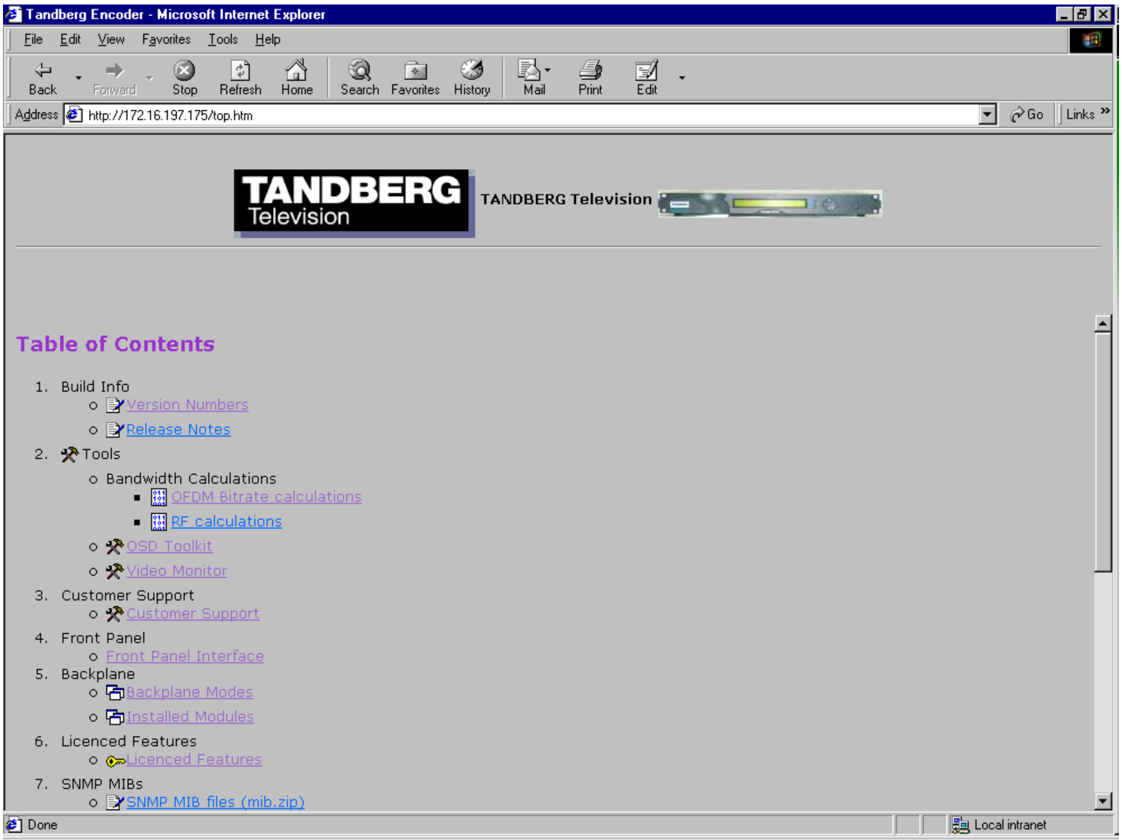


Figure E.1: Web Browser Interface

The dialogue box, see *Figure E.2*, will be displayed.

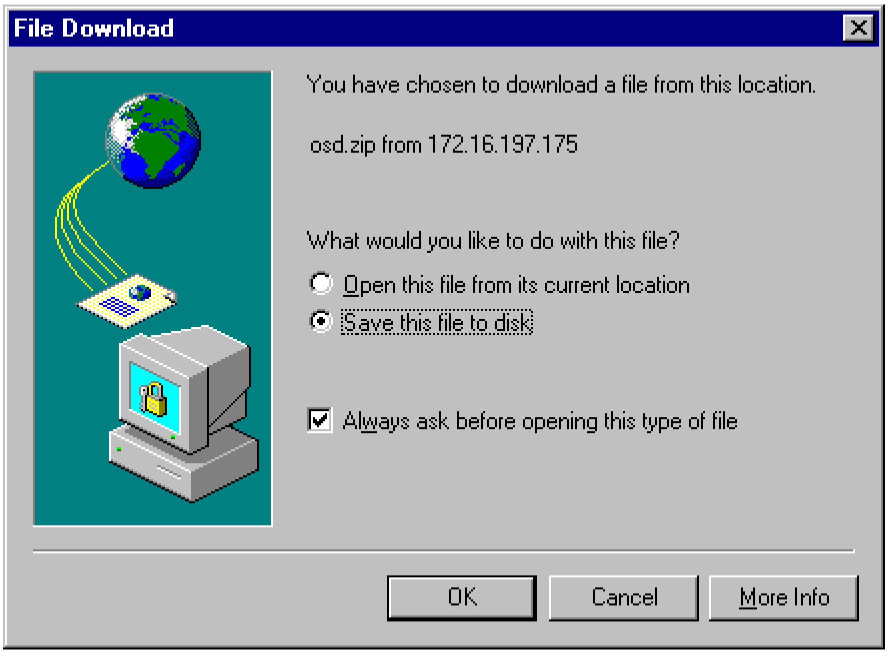


Figure E.2: File Download Dialogue Box

Clicking on option **Open this file from its current location** and Clicking **OK** will open the .zip file, see *Figure E.3*. Clicking on option **Save this file to disk** will allow the user to install the files on their local drive and then open the .zip file as in *Figure E.3*.

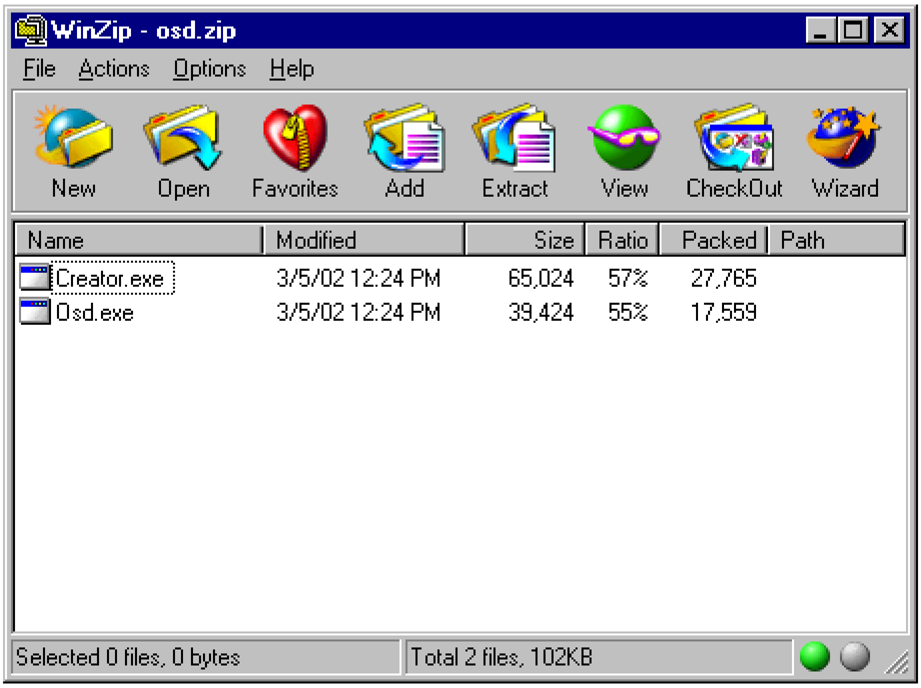


Figure E.3: Files for OSD Creator and Loader

E.4 Creating a Logo Using OSD Creator

Osd Creator (*creator.exe*) is an application for creating logo files (.osd format) for use with the *Osd Loader* application (*osd.exe*) to download them to the Encoder. It accepts Windows Bitmap (.bmp) format files as input. It includes the facility to introduce a **mix** component into the image, so that when the image is superimposed onto video, some areas appear to be transparent.

The application also includes the facility to downsample the image to the desired size.

The application runs under Windows 95 or Windows NT.

> NOTE...
> The *OSD Creator* program only has limited features for the manipulation of images. It is wise to carry out any complex image editing using dedicated graphics software prior to importing the .bmp image file into the *OSD Creator*.

E.5 Using OSD Creator

E.5.1 Overview

To create a logo (.osd) file:

1. Load a Bitmap (.bmp) file.
2. Add transparency in the desired areas.
3. Downsample to the desired size.
4. Save as an .osd file.

An example of a logo is shown in *Figure E.4*.

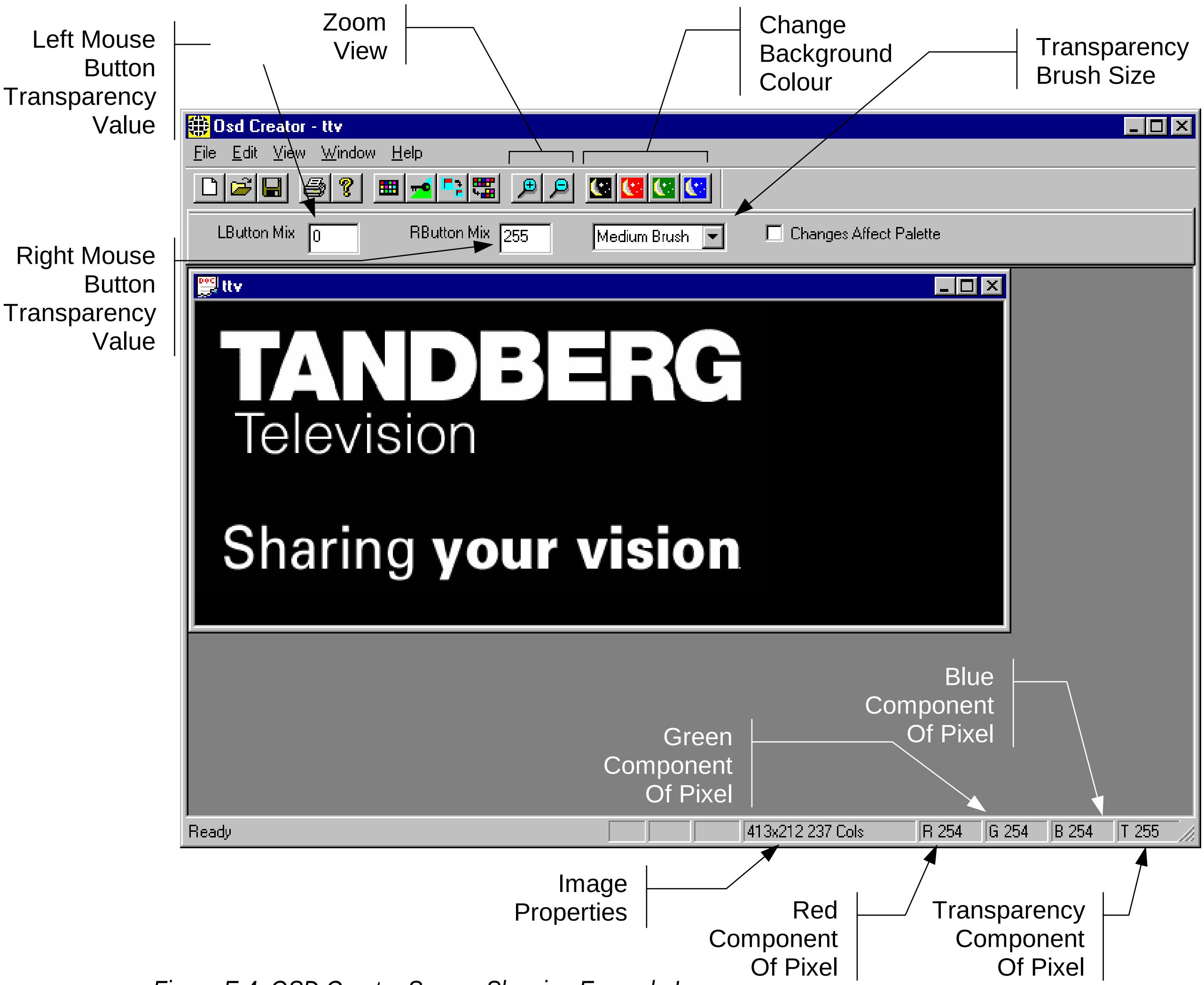


Figure E.4: OSD Creator Screen Showing Example Logo

E.5.2 Loading a .bmp File

Select **File / Open** from the menu, and choose a file with a .bmp extension. The image is displayed in its own window. The application does not accept compressed bitmaps or multi-planed bitmaps. If a 24-bit colour bitmap image is loaded into *Osd Creator* it will be automatically converted down to a 256 colour palette.

E.5.3 Creating Transparency

Overview

Each pixel in a .bmp file is represented by a red, green and blue component, each with a value 0 to 255. *Osd Creator* adds a fourth component for the transparency of the pixel. This is referred to as a **mix** or transparency (T) value and is displayed in the bottom right status panel. The transparency component also has a range of 0 to 255, where 0 is fully transparent and 255 is fully opaque.

Osd Creator uses a colour palette with a maximum of 256 entries. Each pixel in the image is mapped to an entry in the palette, which holds a value for the red, green and blue and transparency component. The transparency (or **mix**) is treated as a colour component, so for two colours with identical red, green and blue values, but different transparency levels, two entries will be generated in the palette.

When a bitmap image is loaded, all colours have a transparency value of 255 (opaque).

The area of the image that is to remain opaque is referred to as the **active area**. The area of the image that is to be made transparent is called the **inactive area**. Transparency can added manually, with a brush, or by using a **key file**.

Adding Transparency Manually

The background colour within *Osd Creator* can be changed with the black, red, green and blue buttons on the toolbar. This changes the background colour of the editor window on which the logo is overlaid and not the logo itself, which remains unaffected. This facility is useful to show the transparency of different colours. It is best to start with a background colour that contrasts sharply with the whole of the source image.

Using the options immediately below the toolbar, the mouse pointer can be used as a brush to add transparency to an area. The left mouse button will apply the transparency value set for the **LButton Mix** and the right mouse button will apply the transparency value set for the **RbuttonMix**. At start-up these are set so **LButton Mix** is 0, to make an area transparent, and **RButton Mix** is 255, to make it opaque.

Different mix levels can be entered for intermediate levels of transparency. Selecting a brush size from the drop-down list determines the size of the area that is changed.

If the **Changes Affect Palette** box is checked, changing the transparency of a pixel on the image also changes the palette entry on which the pixel is based, and all the pixels that share that palette entry.

If the inactive area is mainly one colour, check the **Changes Affect Palette** box, and left-click in the inactive area. All pixels of that colour should become background-coloured. Repeat until the whole of the inactive area is transparent. If parts of the active area have become transparent, uncheck the **Changes Affect Palette** box, and paint with the right button to correct these areas. Zoom in if necessary.

If there is no general colour for the inactive area, uncheck the **Changes Affect Palette** box and paint the inactive area manually with the left mouse button. Use the right button to correct mistakes. Trace around the edge of the area with a medium brush, then use the large brush for wide areas. Zoom in to do the fine corrections.

Adding Transparency Using a Key File

A **key file** is a Bitmap (.bmp) file of the same size as the source file, with the active area of the image coloured white, the inactive area coloured black, and intermediate levels of transparency coloured grey.

Create the **key file** using a drawing package. Colour the active area white, and the inactive area black. Save as a .bmp file.

Click the **Key File** toolbar button. Select the **key file**. The inactive area of the image should now be transparent (background-coloured). Change the background colour to verify that the correct area is transparent.

Editing the Palette

The palette may be displayed alongside the image by clicking the **Show / Hide Palette** toolbar button. The transparency of each palette entry may be altered in the same way as the image itself, using the left and right mouse buttons. Changes to the palette are shown immediately on the image.

The Red, Green, Blue and Mix component of the pixel or palette entry under the cursor can be seen on the status bar at the bottom of the screen.

Palette Reallocation

When the level of transparency of a pixel in the image is changed, a new colour is effectively created. Whenever the image is downsampled or saved, the palette is rebuilt to reflect the actual colours in the image. As part of this process, pixels which have a mix value of zero are mapped to palette entry zero, which is defined as Red = Green = Blue = Mix = 0. The original colour information is lost and the right mouse button will not change the pixel back to its original colour.

To rebuild the palette during editing, click the **Reallocate Palette** toolbar button.

E.5.4 Downsampling

Click the **Downsample** toolbar button. A dialog box appears asking for a downsampling ratio. This can be specified directly, or by entering the desired image size. Click OK to downsample the image. The downsampling algorithm includes a filter, so the boundary between the active and inactive areas softens slightly. Zoom in and check that the correct areas are transparent, and make corrections if necessary.

> NOTE...
>
> Once the image has been downsampled, the process cannot be reversed to change the image back to its original size.

E.5.5 Saving the .osd File

Select **File / Save As / OSD file** from the menu. Saving is possible at any time, and it is advisable to save the image often while editing is in progress. The file may also be saved in .bmp format, but this file will not contain transparency information.

E.6 Downloading a Logo Using OSD Loader

The *Osd Loader* application (osd.exe) is used for downloading logo (.osd) files to the Encoder and controlling which are displayed.

The application runs on a PC with Windows 95 or Windows NT. A network connection is required. The target Encoder's IP address must be **visible** from the host PC.

The application uses the .osd file format for images. These can be derived from Windows .bmp files using the ***OSD Creator*** application (see *Section E.4, Creating a Logo Using OSD Creator*).

An example of an OSD Loader screen is shown in *Figure E.5*.

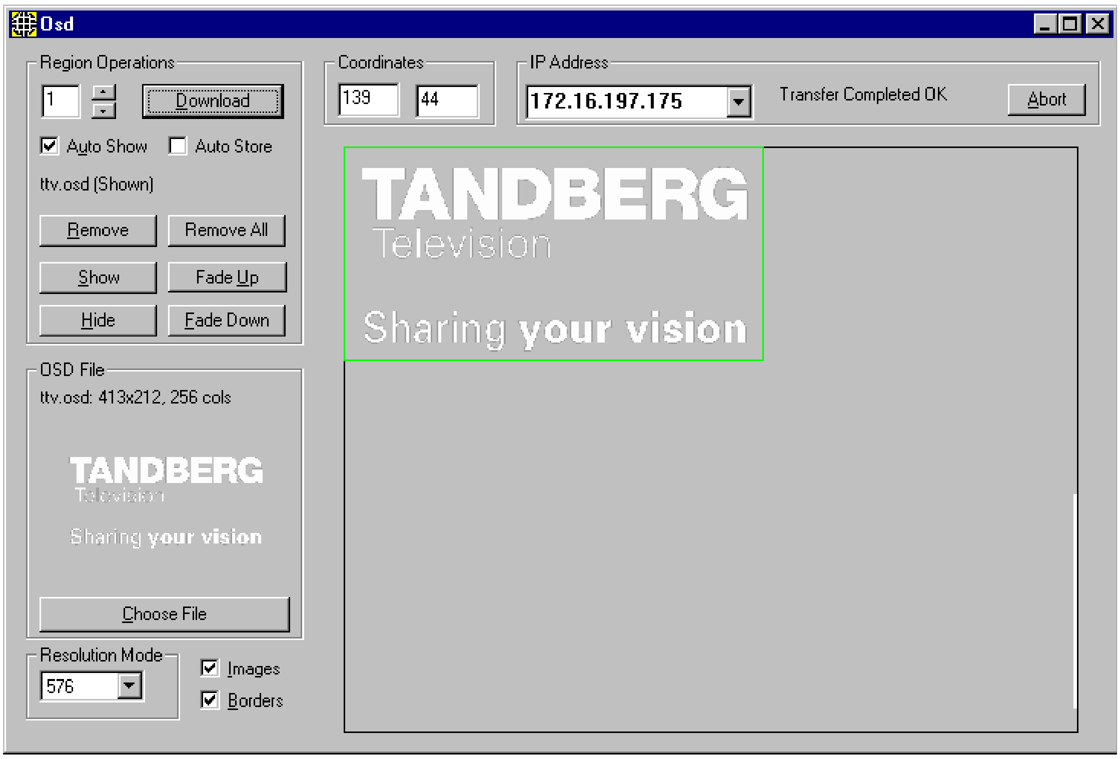


Figure E.5: OSD Loader Screen Showing Example Logo

E.7 Using the OSD Loader

E.7.1 Start-up

Activate the application (*osd.exe*). The application attempts to connect to the last known Encoder address. If the address is not correct, click the **Abort** button and enter the IP address of the target Encoder. This can be found on the Encoder front panel by selecting **Setup / System / Remote Control**. To test the connection, click the **Remove All** button (you will be prompted for confirmation – **Remove all OSD Regions Yes / No**). The communications box (at the top of the screen) should read **Transfer Completed OK**.

The **Resolution Mode** must be set to match the video resolution being used. This adjusts the preview screen to the dimensions of the active video.

Table E.1: Resolution Modes

Resolution Mode	Video Standard
576	Standard Definition 625 line
480	Standard Definition 525 line
480p	Not Supported
576p	Not Supported
720p	Not Supported
1080i	Not Supported

E.7.2 Download an .osd File

Choose an On-screen Display file with the **Choose File** button. You will be prompted for a file with an .osd extension. The image will be displayed in the **OSD File** box.

Position the image on the screen by dragging the white cursor box around the main placement window. The position can also be adjusted by editing the co-ordinates boxes.

A logo can be overlaid anywhere in the digital active picture. When a logo is positioned in the main placement window, the co-ordinates are shown for the top left corner of the logo. The co-ordinates that the *Osd Loader* uses include an offset. *Figure E.6* and *Figure E.7* illustrate how these co-ordinates relate to the active picture.

When the logo is correctly positioned, click the **Download** button. **Transferring Data...** appears in the communications box. The image will be displayed in the main window. Wait for **Transfer Completed OK** to appear in the communications box. After a short delay, the image should appear on the output from the Receiver.

If the **Auto Store** box is checked, when the logo is downloaded to the Encoder, it will be stored in Flash memory and will still be present after the Encoder has been powered off. Only one logo can be stored in Flash at any time. The maximum logo file size that can be stored in Flash is 65 279 bytes. The file size will be affected by the size of the logo and its complexity (number of colours and levels of transparency). For example this is roughly equivalent to a logo 200 x 145 pixels with 256 colours (62 567 bytes).

If the **Auto Store** box is left unchecked, the downloaded logo will be stored in volatile memory and will be lost when power is removed from the Encoder.

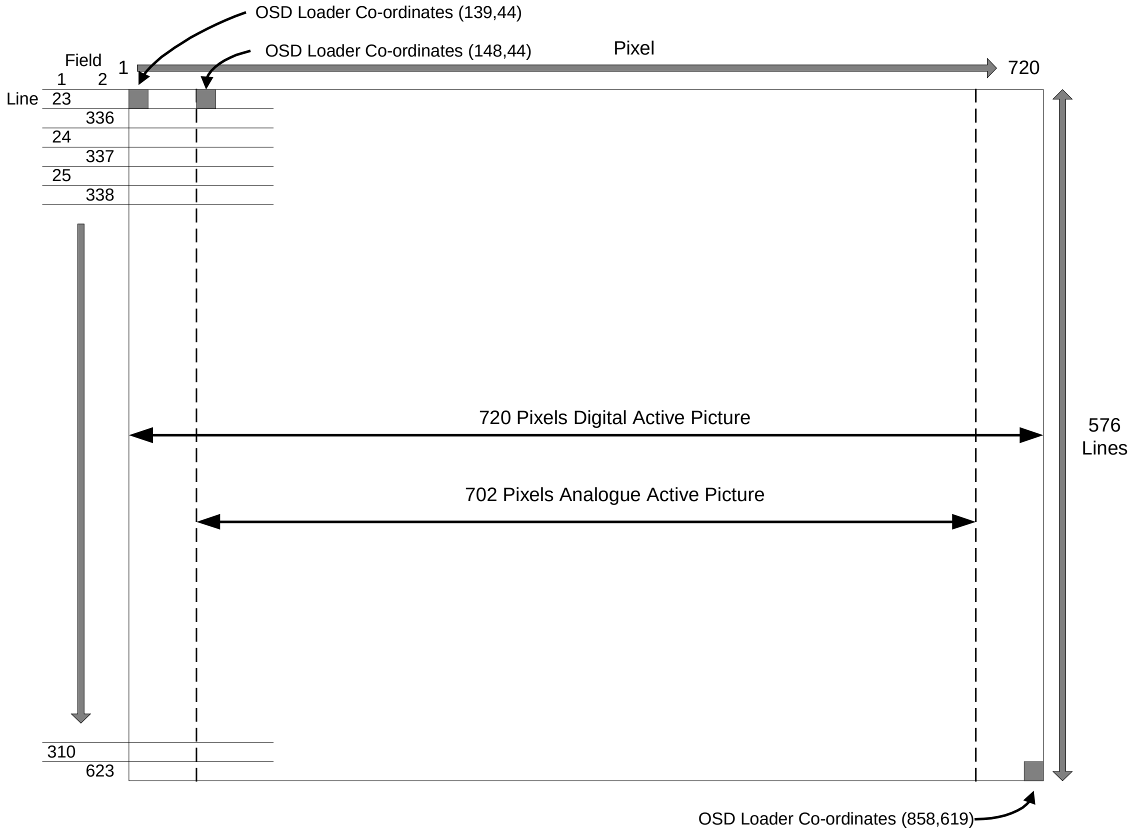


Figure E.6: 625 Line, OSD Co-ordinates in Active Picture

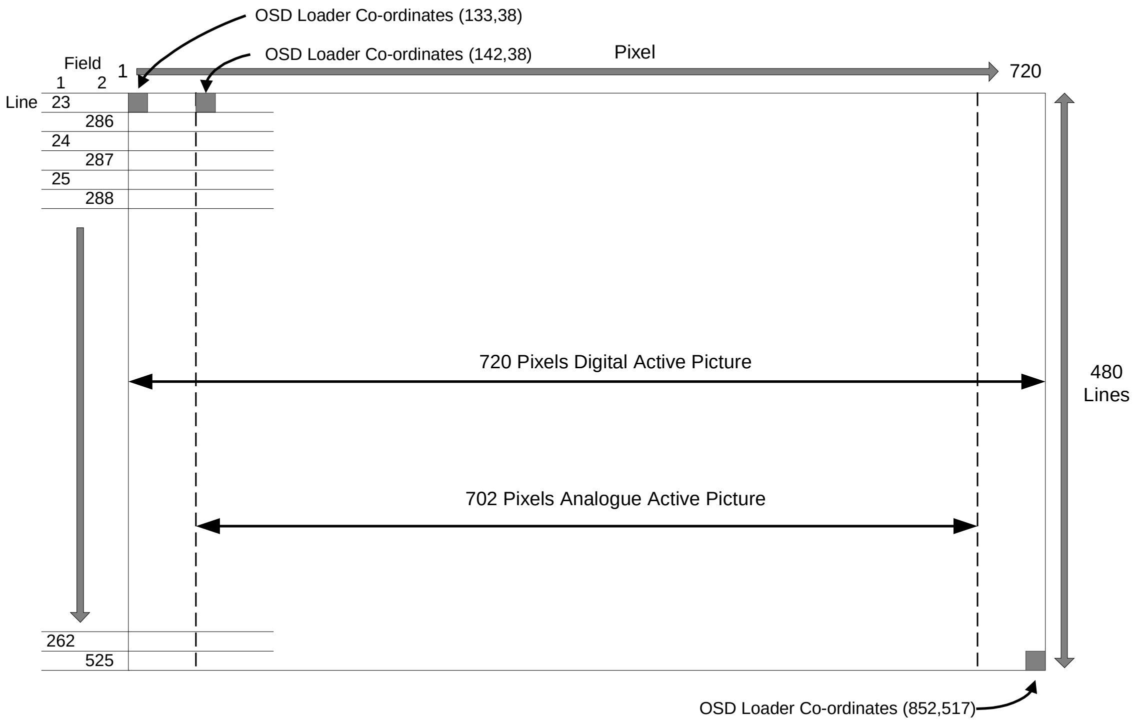


Figure E.7: 525 Line, OSD Co-ordinates in Active Picture

E.7.3 Show and Hide Regions

The **Download** button defines a Region in the Encoder, which remains until the Encoder is turned off, the **Remove** button is clicked, or the Region is **Download**ed again. The Region may be in the Shown or Hidden state, which determines whether it appears in the video stream. If the **Auto Show** box is checked, the initial state is Shown. Use the **Show, Hide, Fade Up** and **Fade Down** buttons to change the state of the region. Shown regions have a green border in the main window, Hidden regions have a red border.

> NOTE...
>
> Remove or Remove all does not erase a logo that has been stored in Flash memory. It will be removed from the video picture, but will still be available from the front panel Stored OSD On/Off menu option.

E.7.4 Multiple Regions

Multiple Regions may be displayed. To define an additional Region, change the Region Number at the top of the **Region Operations** box, and repeat the **Download** procedure. Buttons in the **Region Operations** box only affect the current Region number (with the exception of **Remove All**). The current Region can also be changed by double-clicking on the image in the main window. The current region has a brighter border in the main window. Uncheck the **Images** box to display the Region number in the main window instead of the image.

E.7.5 Region Interference

If two Regions share a horizontal line, they may interfere. This means that when both Regions are Shown, only one actually appears in the video stream. The application warns if this is the case. When one of the Regions is Hidden, the other may be Shown as normal.

E.8 Fault-finding

If there appears to be a problem creating or downloading a logo check the following:

- If the Communications box reads "Error Creating Socket", there may be a problem with the PC's network set-up, or another application may be using the TFTP socket number.
- If the Communications box reads "Waiting For Response" for a long time, the target Encoder is either busy or not visible on the network. Abort the transfer before changing the IP address.
- Large images take time to appear due to network transfer rates and image processing.
- If the download completes, but the OSD image does not appear on video, the image may be too near the edge of the screen – try moving it towards the centre. Make sure the correct line standard is selected.
- Make sure the image is visible on a typical domestic television. Make a note of the co-ordinates where the image is required.
- If precise timing is required, **Download** the image in advance with **Auto Show** off, then click **Show** when display is required.
- To move the current Region, reposition the white cursor, check that the **OSD File** box has the correct image, and click **Download**.

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Annex F

Band Plans

Contents

List of Tables

BLANK

F.1 Channels and Centre Frequencies

The `Output Menu` has options called **Band Plan** and **Channel** (see *Chapter 4, Operating the Equipment Locally*).

Once a country has been selected in the **Band Plan** option then the required channel should be selected in the **Channel** option. Each channel number corresponds to a particular frequency.

> NOTE...
> Only those frequencies associated with a channel number can be selected.

This Annex contains the channel IDs and centre frequencies for the band plans in the `Output Menu`.

If the **Manual** band plan option is selected then the required frequency must be selected manually.

Table F.1: Australia

UHF Channel	Centre Frequency in MHz	UHF Channel	Centre Frequency in MHz	UHF Channel	Centre Frequency in MHz
0	48.500	32	557.500	52	697.500
1	59.500	33	564.500	53	704.500
2	66.500	34	571.500	54	711.500
3	88.00	35	578.500	55	718.500
4	97.500	36	585.500	56	725.500
5	104.500	37	592.500	57	732.500
5A	140.500	38	599.500	58	739.500
6	177.500	39	606.500	59	746.500
7	184.500	40	613.500	60	753.500
8	191.500	41	620.500	61	760.500
9	198.500	42	627.500	62	767.500
9A	205.500	43	634.500	63	774.500
10	212.500	44	641.500	64	781.500
11	219.500	45	648.500	65	788.500
12	226.500	46	655.500	66	795.500
27	523.500	47	662.500	67	802.500
28	529.500	48	669.500	68	809.500
29	536.500	49	676.500	69	816.500
30	543.500	50	683.500		
31	550.500	51	690.500		

Table F.2: Europe VHF

UHF Channel	Centre Frequency in MHz
E 2	50.500
E 3	57.500
E 4	64.500
E 5	177.500
E 6	184.500
E 7	191.500

UHF Channel	Centre Frequency in MHz
E 8	198.500
E 9	205.500
E 10	212.500
E 11	219.500
E 12	226.500

Table F.3: EuropeCATV

UHF Channel	Centre Frequency in MHz
S 4	128.500
S 5	135.500
S 6	142.500
S 7	149.500
S 8	156.500
S 9	163.500
S 10	170.500
S 11	233.500
S 12	240.500

UHF Channel	Centre Frequency in MHz
S 13	247.500
S 14	254.500
S 15	261.500
S 16	268.500
S 17	275.500
S 18	282.500
S 19	289.500
S 20	296.500

Table F.4: Italy

UHF Channel	Centre Frequency in MHz
A	56.000
B	64.500
C	84.500
D	177.500
E	186.000

UHF Channel	Centre Frequency in MHz
F	194.500
G	203.500
H	212.500
H_1	219.500
H_2	226.500

Table F.5: Morocco

UHF Channel	Centre Frequency in MHz
M 4	165.500
M 5	173.500
M 6	181.500
M 7	189.500

UHF Channel	Centre Frequency in MHz
M 8	197.500
M 9	205.500
M 10	213.500

Table F.6: New Zealand

UHF Channel	Centre Frequency in MHz	UHF Channel	Centre Frequency in MHz
1	47.500	6	191.500
2	57.500	7	198.500
3	64.500	8	205.500
4	177.500	9	212.500
5	184.500	10	219.500

Table F.7: China

UHF Channel	Centre Frequency in MHz	UHF Channel	Centre Frequency in MHz	UHF Channel	Centre Frequency in MHz	UHF Channel	Centre Frequency in MHz
1	52.500	18	514.000	35	690.000	52	826.000
2	60.500	19	522.000	36	698.000	53	834.000
3	68.500	20	530.000	37	706.000	54	842.000
4	80.000	21	538.000	38	714.000	55	850.000
5	88.000	22	546.000	39	722.000	56	858.000
6	171.000	23	554.000	40	730.000	57	866.000
7	179.000	24	562.000	41	738.000	58	874.000
8	187.000	25	610.000	42	746.000	59	882.000
9	195.000	26	618.000	43	754.000	60	890.000
10	203.000	27	626.000	44	762.000	61	898.000
11	211.000	28	634.000	45	770.000	62	906.000
12	219.000	29	642.000	46	778.000		
13	474.000	30	650.00	47	786.000		
14	482.000	31	658.000	48	794.000		
15	490.000	32	666.000	49	802.000		
16	498.000	33	674.000	50	810.000		
17	506.000	34	682.000	51	818.000		

Table F.8: OIRT[1]

UHF Channel	Centre Frequency in MHz	UHF Channel	Centre Frequency in MHz
R I	52.500	R VII	186.000
R II	62.000	R VIII	194.000
R III	80.000	R IX	202.000
R IV	88.000	R X	210.000
R V	96.000	R XI	218.000
R VI	178.000	R XII	226.000

[1] Organisation that co-ordinated TV standards and programme interchange among the Eastern–block countries of Europe.

Table F.9: Ireland

UHF Channel	Centre Frequency in MHz	UHF Channel	Centre Frequency in MHz
I A	48.500	I F	194.000
I B	56.500	I G	202.000
I C	64.500	I H	210.000
I D	178.000	I J	218.000
I E	186.000		

Table F.10: South Africa

UHF Channel	Centre Frequency in MHz	UHF Channel	Centre Frequency in MHz
4	178.000	9	218.000
5	186.000	10	226.000
6	194.000	11	234.000
7	202.000	(12)	242.000
8	210.000	13	250.180

Table F.11: French Overseas PIA

UHF Channel	Centre Frequency in MHz	UHF Channel	Centre Frequency in MHz
4	178.000	7	202.000
5	186.000	8	210.000
6	194.000	9	218.000

Table F.12: France

UHF Channel	Centre Frequency in MHz	UHF Channel	Centre Frequency in MHz
A	45.000	2	186.750
B	53.000	3	194.750
C	61.000	4	202.750
C1	57.750	5	210.750
1	178.750	6	218.750

Table F.13: Japan

UHF Channel	Centre Frequency in MHz	UHF Channel	Centre Frequency in MHz	UHF Channel	Centre Frequency in MHz	UHF Channel	Centre Frequency in MHz
J 1	93.000	18	503.000	35	605.000	52	707.000
J 2	99.000	19	509.000	36	611.000	53	713.000
J 3	105.000	20	515.000	37	617.000	54	719.000
J 4	173.000	21	521.000	38	623.000	55	725.000
J 5	179.000	22	527.000	39	629.000	56	731.000
J 6	185.000	23	533.000	40	635.000	57	737.000
J 7	191.000	24	539.000	41	641.000	58	743.000
J 8	195.000	25	545.000	42	647.000	59	749.000
J 9	201.000	26	551.000	43	653.000	60	755.000
J 10	207.000	27	557.000	44	659.000	61	761.000
J 11	213.000	28	563.000	45	665.000	62	767.000
J 12	219.000	29	569.000	46	671.000	63	773.000
13	473.000	30	575.000	47	677.000		
14	479.000	31	581.000	48	683.000		
15	485.000	32	587.000	49	689.000		
16	491.000	33	593.000	50	695.000		
17	497.000	34	599.000	51	701.000		

Table F.14: USA

UHF Channel	Centre Frequency in MHz	UHF Channel	Centre Frequency in MHz	UHF Channel	Centre Frequency in MHz	UHF Channel	Centre Frequency in MHz
A 02	57.000	23	527.000	44	653.000	65	779.000
A 03	63.000	24	533.000	45	659.000	66	785.000
A 04	69.000	25	539.000	46	665.000	67	791.000
A 05	79.000	26	545.000	47	671.000	68	797.000
A 06	85.000	27	551.000	48	677.000	69	803.000
A 07	177.000	28	557.000	49	683.000	70	809.000
A 08	183.000	29	563.000	50	689.000	71	815.000
A 09	189.000	30	569.000	51	695.000	72	821.000
A 10	195.000	31	575.000	52	701.000	73	827.000
A 11	201.000	32	581.000	53	707.000	74	833.000
A 12	207.000	33	587.000	54	713.000	75	839.000
A 13	213.000	34	593.000	55	719.000	76	845.000
14	473.000	35	599.000	56	725.000	77	851.000
15	479.000	36	605.000	57	731.000	78	857.000
16	485.000	37	611.000	58	737.000	79	863.000
17	491.000	38	617.000	59	743.000	80	869.000
18	497.000	39	623.000	60	749.000	81	875.000
19	503.000	40	629.000	61	755.000	82	881.000
20	509.000	41	635.000	62	761.000	83	887.000
21	515.000	42	641.000	63	767.000		
22	521.000	43	647.000	64	773.000		

Table F.15: CCIR[2]

UHF Channel	Centre Frequency in MHz	UHF Channel	Centre Frequency in MHz	UHF Channel	Centre Frequency in MHz
21	474.000	38	610.000	55	746.000
22	482.000	39	618.000	56	754.000
23	490.000	40	626.000	57	762.000
24	498.000	41	634.000	58	770.000
25	506.000	42	642.000	59	778.000
26	514.000	43	650.000	60	786.000
27	522.000	44	658.000	61	794.000
28	530.000	45	666.000	62	802.000
29	538.000	46	674.000	63	810.000
30	546.000	47	682.000	64	818.000
31	554.000	48	690.000	65	826.000
32	562.000	49	698.000	66	834.000
33	570.000	50	706.000	67	842.000
34	578.000	51	714.000	68	850.000
35	586.000	52	722.000	69	858.000
36	594.000	53	730.000		
37	602.000	54	738.000		

[2] CCIR is now know as International Telecommunications Union-Radiocommunications Study Groups.

Annex G

Audio Modes

Contents

List of Figures

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G.1 Analogue Audio

Figure G.1 shows the coding methods that may be used with the analogue audio input.

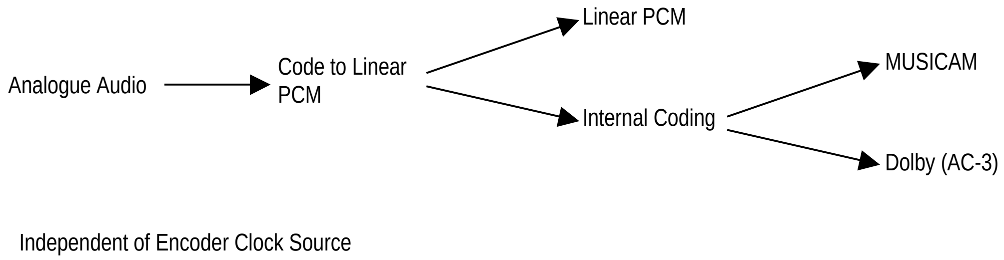


Figure G.1: Analogue Audio Modes

G.2 Digital Audio

When a digital audio source is used, consideration must be given to the choice of clock source used by the Encoder. To ensure correct operation the Encoder and the audio may need to be genlocked. *Figure G.2* shows the clock source that is appropriate for a given audio coding mode. The two main clock sources are internal and external (derived from the H SYNC input).

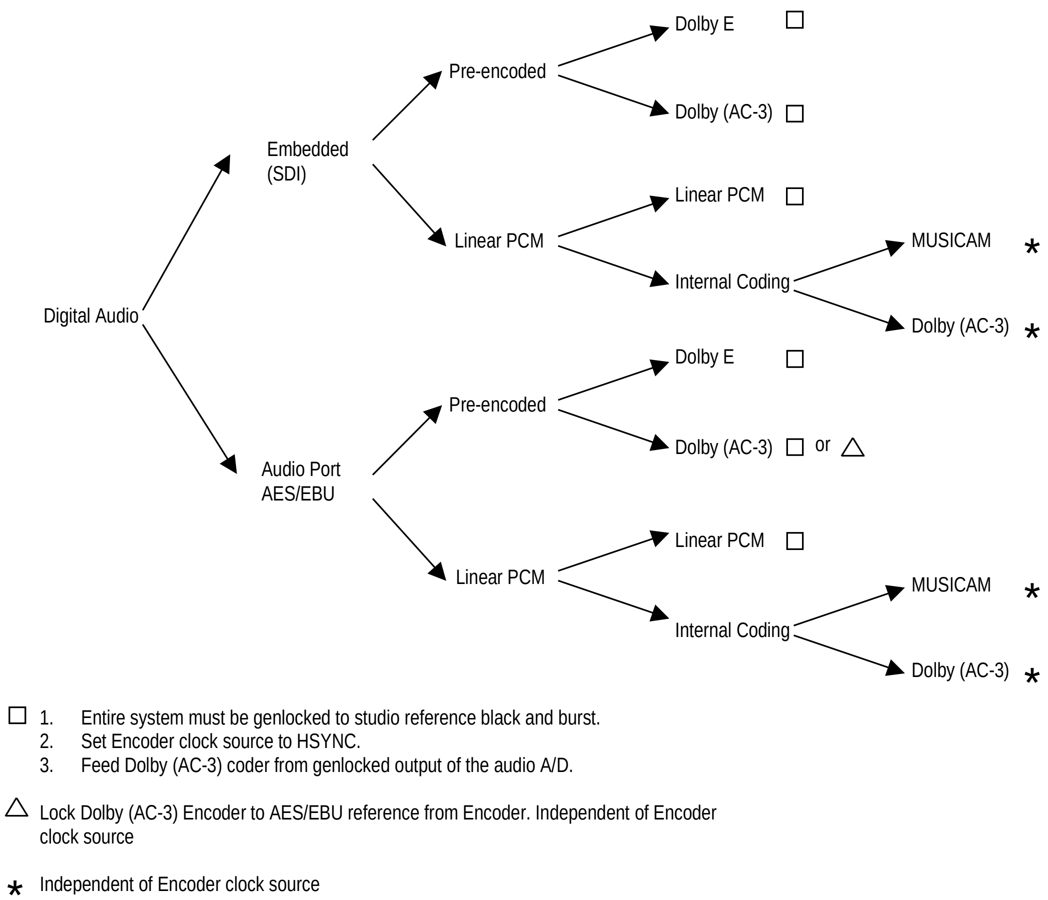


Figure G.2: Digital Audio Modes

G.3 Embedded Audio on the SDI

Figure G.3 shows the audio signal flow on the Base Board. While six audio stereo pairs are available, only two stereo pairs can be processed by the Base Board at any one time.

Audio can be embedded on a SDI video feed. The specified groups are: 1, 2, 3, 4. Each group contains two stereo pairs, hence each SDI can carry a maximum of 2 x 4 = 8 stereo pairs, or 16 mono channels.

Each group has an associated Data Identifier (DID). The standard DIDs are typically:

- Group 1 = 0x2FF
- Group 2 = 0x1FD
- Group 3 = 0x1FB
- Group 4 = 0x2F9

Other DIDs are possible. Refer to the SMPTE 272M specification for more details. DID 1F4 is reserved for EDH error packets.

G.4 Detail of Encoder Operation

The Encoder can de-embed any two DID s at any one time, thus giving a total of four embedded audio sources: embedded audio 1-4.

The default DID for embedded audio 1-2 is 2FFh (Group 1).

The default DID for embedded audio 3-4 is 1FDh (Group 2).

The DIDs are located in ancillary packets in the data stream.

> NOTE...
> Default DIDs are selected when a DID value ≥1024 is set.

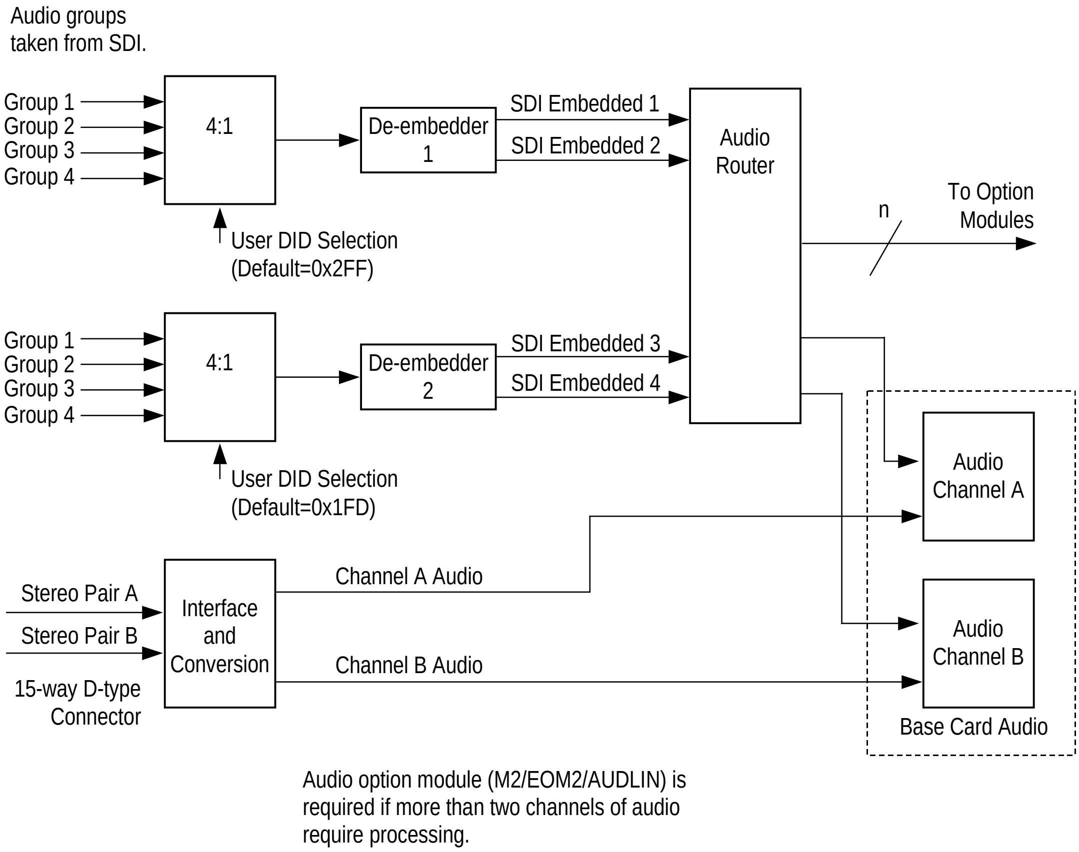


Figure G.3: Embedded Audio and Stereo Pairs

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Annex H

Error Messages

Contents

List of Tables

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H.1 Introduction

> WARNING...
>
> DO NOT REMOVE THE COVERS OF THIS EQUIPMENT. HAZARDOUS VOLTAGES ARE PRESENT WITHIN THIS EQUIPMENT AND MAY BE EXPOSED IF THE COVERS ARE REMOVED. ONLY TANDBERG TELEVISION TRAINED AND APPROVED SERVICE ENGINEERS ARE PERMITTED TO SERVICE THIS EQUIPMENT.

If an error occurs in the DSNG Voyager Encoder (Encoder) then a message indicating the type of error is shown on the front panel display. Any of the errors can be masked or suppressed. There are three states: Alarm, Fail or Off. See *Chapter 4, Section 4.14.3, Error Masks Menu* for details of the masking process.

The possible error messages are listed in the following tables. An alarm condition is a condition which is unusual but which may occur during normal operation (such as loss of video input). A failure condition indicates a hardware or software failure – a condition that should never occur during the normal operating life of the equipment.

Both types of error light the front panel **Alarm** LED, and the alarm relay interface on the **Alarm** connector (see *Chapter 2*, *Installing the Equipment*) will be set according to the type of error (an alarm condition triggers the alarm relay only, and a failure condition triggers both the fail and alarm relays).

H.2 Dealing with Error Messages

The action to take when an error message is reported is given in the following tables. If the fault cannot be resolved using the information provided, make a note of the error message(s) displayed and call a Service Engineer (see *Customer Service Information* in the *Preliminary Pages*).

H.3 General Errors

Table H.1: General Error Messages

Error Message	Action to Take
LCD Not Found	Power Encoder off, then back on again. If the fault persists call a Service Engineer.
Temp Sensor No Pulse	
Temp Sensor Bad CRC	
Temp Sensor Bad Data	
Temp Sensor Busy	
Temp Sensor Comms	
PSU Sensor	
Real Time Clock	
Ethernet Comms	
FPGA Boot Fail	
Over Temperature	Check ventilation slots are clear and unobstructed; see *Chapter 2 Installing the Equipment* for details of ventilation requirements. Check ambient air temperature is within specified range; see *Annex B Technical Specification*. If fault is still present, call Service Engineer.
Under Temperature	Check ambient air temperature is within specified range; see *Annex B Technical Specification.* If fault is still present, call Service Engineer.
Over Voltage (5V)	Power supply unit requires adjustment, call Service Engineer.
Under Voltage (5V)	
Invalid Option Modules	Power Encoder off, then check that the option modules are firmly seated in the chassis. Do this by firmly pressing the module from the rear of the Encoder into the chassis. Power on the Encoder. If the fault persists call Service Engineer.
Test Error	
Video Module	Power Encoder off, then check that the Base Board is firmly seated in the chassis. Do this by firmly pressing it from the rear of the Encoder into the chassis. Power on the Encoder. If the fault persists call Service Engineer.
Audio A Module	
Audio B Module	
Option Slot 1	Power Encoder off, then check that the option cards are firmly seated in the chassis. Do this by firmly pressing the module(s) from the rear of the Encoder into the chassis. Power on the Encoder. If the fault persists call Service Engineer.
Option Slot 2	
Option Slot 3	
Option Slot 4	
Option Slot 5	
Option Slot 6	
Duplicate PMT PID	Check the Encoder configuration.
Invalid PMT PID	
Duplicate PCR PID	
Invalid PCR PID	
System Clock Not Locked	Power Encoder off, then check that the Base Board is firmly seated in the chassis. Do this by firmly pressing it from the rear of the Encoder into the chassis. Power on the Encoder. If the fault persists call Service Engineer.
Mux PCR not incrementing	
CA Module not present	
CA Module Boot Fail	

H.4 Video Source Related Errors

Table H.2: Video Source Error Messages

<table>
<tr><th>Error Message</th><th colspan="2">Action to Take</th></tr>
<tr><td>Comms Error</td><td colspan="2">Power Encoder off, then check that the Base Board is firmly seated in the chassis. Do this by firmly pressing it from the rear of the Encoder into the chassis. Power on the Encoder. If the fault persists call Service Engineer.</td></tr>
<tr><td>Video Lock (Composite)</td><td colspan="2" rowspan="3">Check video input is present and that the Encoder is configured for the correct frame rate.</td></tr>
<tr><td>Video Lock (SDI)</td></tr>
<tr><td>Video Line Standard</td></tr>
<tr><td>EDH Full Field Error</td><td>A full field CRC error was detected in the SDI data.</td><td rowspan="9">Check the source of the SDI data, and any equipment in the signal path between the source and the Encoder, and all related cables and connectors. If the source, (or any intervening devices) do not support EDH, then these messages do not indicate a fault with the Encoder. Try to verify the link with another Receiver. If the link is verified as OK then call Service Engineer.</td></tr>
<tr><td>EDH Full Field Unknown Error</td><td>The status of the full field flags is not known as the SDI stream is received from a transmitter that does not support EDH</td></tr>
<tr><td>EDH Full Field Error Already</td><td>A full field CRC error was detected in the SDI link ‘upstream of the Encoder.</td></tr>
<tr><td>EDH Picture Error</td><td>A active picture CRC error was detected in the SDI data.</td></tr>
<tr><td>EDH Picture Error Unknown Err</td><td>The status of the active picture flags is not known as the SDI stream is received from a transmitter that does not support EDH</td></tr>
<tr><td>EDH Picture Error Already</td><td>An active picture CRC error was detected in the SDI link ‘upstream of the Encoder.</td></tr>
<tr><td>EDH Anc. Data Error</td><td>A ancillary data CRC error was detected in the SDI data.</td></tr>
<tr><td>EDH Anc. Data Unknown Error</td><td>The status of the ancillary data flags is not known as the SDI stream is received from a transmitter that does not support EDH</td></tr>
<tr><td>EDH Anc. Data Error Already</td><td>An ancillary data CRC error was detected in the SDI link ‘upstream of the Encoder.</td></tr>
<tr><td>Composite Input Calibrati</td><td colspan="2">Power Encoder off, then check that the Base Board is firmly seated in the chassis. Do this by firmly pressing it from the rear of the Encoder into the chassis. Power on the Encoder. If the fault persists call Service Engineer.</td></tr>
</table>

H.5 VBI Related Errors

Table H.3: VBI Error Messages

Error Message	Action to Take
Duplicate VBI PID	Check the Encoder configuration.
Invalid VBI PID	
Duplicate Teletext PID	
Invalid Teletext PID	
Closed Caption (Line 21)	Verify that the appropriate VBI is present in the video source. If it is, power Encoder off, then check that the Base Board is firmly seated in the chassis. Do this by firmly pressing it from the rear of the Encoder into the chassis. Power on the Encoder. If the fault persists call Service Engineer.
Closed Caption (Ext. Data)	
Neilson/AMOL 1 Detection	
Neilson /AMOL 11 Detection	
VPS Detection	
WSS Detection	
VITC Detection	
Video Index Detection	
No Teletext Data Detected	
No inverted Teletext Dat	

H.6 Remote Control Related Errors

Table H.4: Remote Control Error Messages

Error Message	Action to Take
Ethernet Comms	Power Encoder off, then check that the Base Board is firmly seated in the chassis. Do this by firmly pressing it from the rear of the Encoder into the chassis. Power on the Encoder. If the fault persists call Service Engineer.
SNMP Undo Fail	

H.7 Data Related Errors

Table H.5: Data Error Messages

Error Message	Action to Take
Comms Error	Power Encoder off, then check that the Base Board and any data modules are firmly seated in the chassis. Do this by firmly pressing them from the rear of the Encoder into the chassis. Power on the Encoder. If the fault persists call Service Engineer.
Config Update	
Processor Stopped	
Duplicate PID	Check the Encoder configuration.
Invalid PID	
Mux Bit-Rate too low	
Data Overflow	
Data Underflow	
Mux FIFO Full	

H.8 Video Encoder Related Errors

Table H.6: Video Encoder Error Messages

Error Message	Action to Take
Comms Error Config Update VCM Stopped	Power Encoder off, then check that the Base Board is firmly seated in the chassis. Do this by firmly pressing it from the rear of the Encoder into the chassis. Power on the Encoder. If the fault persists call Service Engineer.
Bad Parameters Duplicate PID Invalid PID VBI, Bit-rate too low VBI Hor Res too low Mux Bit-rate too low	Check the Encoder configuration.
No interrupt DSP Overrun Boot Fail Bad Frame Rate Rate Buffer OF/UF DSP Health Bad Filter Coeffs Repeated PCR Resync Coding Mode Error PCR Error No PowerUp Tests	Power Encoder off, then check that the Base Board is firmly seated in the chassis. Do this by firmly pressing it from the rear of the Encoder into the chassis. Power on the Encoder. If the fault persists call Service Engineer.
No Reflex Messages	Check Ethernet connection to Encoder.

H.9 Audio Related Errors

Table H.7: Audio Error Messages

Error Message	Action to Take
Module Fault Comms Error Config Update Processor Stopped	Power Encoder off, then check that the Base Board and any audio modules are firmly seated in the chassis. Do this by firmly pressing them from the rear of the Encoder into the chassis. Power on the Encoder. If the fault persists call Service Engineer.
Incorrect parameters	Check the parameter settings for the reported audio channel.
PCR Error	Power Encoder off, then check that the Base Board and any audio modules are firmly seated in the chassis. Do this by firmly pressing them from the rear of the Encoder into the chassis. Power on the Encoder. If the fault persists call Service Engineer.
Silence Timeout Left Silence Timeout Right	A silence timeout period can be set (contact Customer Services for details). The error message is generated if the audio is silent for greater than the timeout period. The default timeout period is 0 which disables this feature, and so the error should not be reported.

Error Message	Action to Take
Level Clipping Left	Audio input level on the reported channel is too high and is being clipped. Reduce the audio input level.
Level Clipping Right	
Embedded Source 1	Check the audio input cable is correctly fitted, and that the audio source is functioning. If the fault persists call Service Engineer.
Embedded Source 2	
Embedded Source 3	
Embedded Source 4	
AC-3 Input Invalid	
No Digital Input	
Mux FIFO Overflow	Power Encoder off, then check that the Base Board and any audio modules are firmly seated in the chassis. Do this by firmly pressing them from the rear of the Encoder into the chassis. Power on the Encoder. If the fault persists call Service Engineer.
Duplicate PID	
Invalid PID	
Mux Bit-Rate too low	
Audio Un-Calibrated	

H.10 Satellite Modulator Related Errors

Table H.8: Satellite Modulator Error Messages

Error Message	Action to Take
Config Update	Power Encoder off, then check that the Base Board and Satellite Modulator are firmly seated in the chassis. Do this by firmly pressing them from the rear of the Encoder into the chassis. Power on the Encoder. If the fault persists call Service Engineer.
Processor Stopped	
Hardware Fault	
FPGA Configuration	
FPGA Temperature	
DLL Unlocked	
Module Uncalibrated	
Modulation Fault	
Synthesiser Unlocked	
ALC Error	
Input Clock Fault	
Input Sync Fault	
TSI FIFO	
DPC FIFO	
Parameter Fault	
IF Card Missing	

H.11 Remux Related Errors

Table H.9: Remux Error Messages

Error Message	Action to Take
Overflow On Input 1	Reduce incoming bit-rate.
Overflow On Input 2	
Overflow On Input 3	
Overflow Motherboard O/P	Reduce incoming bit-rate of services, or turn off some services.
Remux Card Stopped	Power Encoder off, then check that the Remux module is firmly seated in the chassis. Do this by firmly pressing it from the rear of the Encoder into the chassis. Power on the Encoder. If the fault persists call Service Engineer.
Motherboard O/P TS	Power Encoder off, then check that the Base Board is firmly seated in the chassis. Do this by firmly pressing it from the rear of the Encoder into the chassis. Power on the Encoder. If the fault persists call Service Engineer.

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Annex I

Accuracy of Frequency Sources

This equipment is based around ISO/IEC 13818 specifications (commonly known as MPEG-2) and within these specifications all timing is derived from a 27 MHz system clock. The system clock is required to have an accuracy of better than ±30 ppm.

An oven-controlled crystal oscillator (OCXO) within this equipment achieves the ±30 ppm accuracy within five minutes of applying power. This accuracy is maintained over the specified operating temperature range for the life of the product without further adjustment.

Composite television systems such as PAL and NTSC have traditionally used high precision oscillators for colour sub-carrier. Many different specifications are in common use and a required accuracy in the range ±0.2 ppm to ±2 ppm is common. Typically an entire TV studio runs from a central frequency standard, with all equipment being fed with a Black and Burst reference signal.

Generally, individual items of equipment are not capable of the required accuracy in the absence of this reference. Where a suitable reference is not available (e.g. outside broadcast or intercontinental programme exchange) the specifications allow a relaxed accuracy.

When this equipment is used to source a timing reference which is used to generate a composite video output (for instance the PAL or NTSC output of a TANDBERG Television Receiver/Decoder) the accuracy of the resultant sub-carrier is directly traceable to the 27 MHz system clock in this equipment.

To ensure continuing accuracy, the system clock in this equipment can be locked to an appropriate frequency reference by feeding a Black and Burst signal to the H SYNC input. Alternatively, the system clock can be locked to the video input. In either case, the system clock is frequency-locked to the source sync pulses, and hence the composite video sub-carrier is as accurate as the frequency reference.

Where an accurate reference signal is not available, the OCXO in this equipment must be used. The OCXO is adjusted to better than ±0.2 ppm during manufacture, but due to natural ageing of the OCXO, regular calibration is required to keep the OXCO within ±0.2 ppm if composite video accuracy is to be maintained. Calibration intervals depend on the requirements of the particular composite video specification in force. Please contact TANDBERG Television Customer Services for advice.

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Annex J

Use of Remux Card in ASTC

Contents

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J.1 Remux Card In ATSC With Internal PSIP

The Encoder automatically remuxes ATSC streams arriving at its inputs, as in DVB. The Encoder uses the PAT (Program Association Table) and PMT (Program Map Table) to work out all the associated PIDs (Packet Identifier), and attempt to extract the short name, the long name, and the Service Type from the VCT (Virtual Channel Table).

> NOTE...
>
> If more than one program is present on any input the Encoder may be unable to extract any information from the VCT on that input.

The Encoder then maps the PIDs using the program paradigm based upon the program number. If possible, the program number of the input is preserved. In Intelligent mode the Encoder automatically remaps the program number/PIDs if a clash occurs. If an active program is overwritten by another, the program number/PIDs of the first program are changed to non-clashing values. In Dumb mode the Encoder requires a user to remap clashing program numbers/PIDs to prevent overwriting an active program.

The Encoder generates all PSIP (Program System Information Protocol) tables for the output stream. It generates a minimum set of tables containing a minimum amount of data. The tables constructed are the:

- MGT (Master Guide Table)
- CVCT (Cable Virtual Channel Table) or
- TVCT (Terrestrial Virtual Channel Table)
- STT (System Time Table)
- RRT (Rating Region Table)
- EIT (Event Information Table) 0, 1, 2, and 3
- PAT
- CAT (Conditional Access Table)
- PMT

The program paradigm is applied to any input program which has a program number of less than 256. If the program number is greater than 255 any PID may be used for each stream. If a non-ATSC service is detected then that may also be passed through the Remux card as an ATSC program. The program paradigm will be applied to such a service if possible and if the program number is less than 256.

J.2 Remux Card In ATSC With External PSIP

The Encoder only provides a minimum amount of information within the PSIP tables. If more sophisticated tables are required then the PSIP may be fed in externally using an ASI input on the Remux card. The user is able to specify a PID range via a minimum and maximum PID. The user then selects a port to use and chooses a Service Info level of ‘On (Ext. PSIP)’. All PIDS between the maximum and minimum are then mapped directly to the output.

In this configuration the Encoder generates the PAT, CAT and PMT for all programs but it is the responsibility of the user to provide all the PSIP for the associated programs. Any programs present on the same input as the external PSIP are not detected and are not referenced in the PAT.

This mode may be also be used for passing data through the Remux card.

> NOTE...
>
> It can take a long time to map a range of PIDs using the Remux card, and for usability the range should be kept to a minimum. For instance, it takes approximately 80 seconds to map 4000 PIDs.

If the External PSIP input port is changed, the Encoder may fail to correctly map the PIDs on the new port. This can be resolved by rebooting the Encoder.

Annex K

EDH Capability for E57xx Encoders

Contents

List of Tables

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K.1 EDH Capability for E57xx Encoders

Table K.1 contains EDH capability for different mux firmware versions. To find the mux firmware version for a particular Encoder refer to `Summary Screen/More/Advanced/Setup/System/Build Menu`.

Table K.1: EDH Capability Matrix for E57xx Encoders

	Mux F/W V14 and below		Mux F/W V15	
	Base Card Not Modified	Base Card Modified	Base Card H/W Mod Strike 11 and below	Base Card H/W Mod Strike 12 and above
Software versions 2.0.0 and above (excluding 3.0.1)	EDH does not work, no errors reported • Software aware that EDH is not supported		EDH works, but unreliably • EDH support only partially implemented in software	EDH works, but unreliably • EDH support only partially implemented in software
Software versions 3.0.1 and above	EDH does not work, no errors reported • Software aware that EDH is not supported • Various EDH status flags available in the menus (all inactive) • UES (Unknown Error Status) flags active		EDH works partially, converts edh errors to eda, does not report all errors • Gennum chip modifies EDH data in incoming SDI stream • If EDH is not present in incoming stream, Gennum chip inserts it; therefore the Encoder thinks EDH was there all along. Error detection in this case is unreliable as the CRCs and checksums are calculated AFTER the errors have occurred. • If EDH is present in incoming stream (the most likely scenario) the Gennum chip detects CRC and checksum errors (edh), turns those errors into edas and recalculates CRCs. In this case the Encoder reports the wrong type of errors, which would make fault-finding very confusing for an operator trying to find a fault in the SDI chain.	EDH works as per specifications

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Indexes

This section is split into two parts. The first is the **General Index** and the second is devoted to **Setup Menus and Associated Options**.

The following conventions are used in this manual: a page number entry in **bold** indicates a reference to a heading; a page number entry in *italic* is a reference to a table or figure; otherwise the page number indicates a reference to an entry on that page.

General Index

B

C

D

E

F

G

H

I

K

L

M

N

O

T

Setup Menus and Associated Options Index

I

M

O

R

S

V